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OCTOBER, 1951

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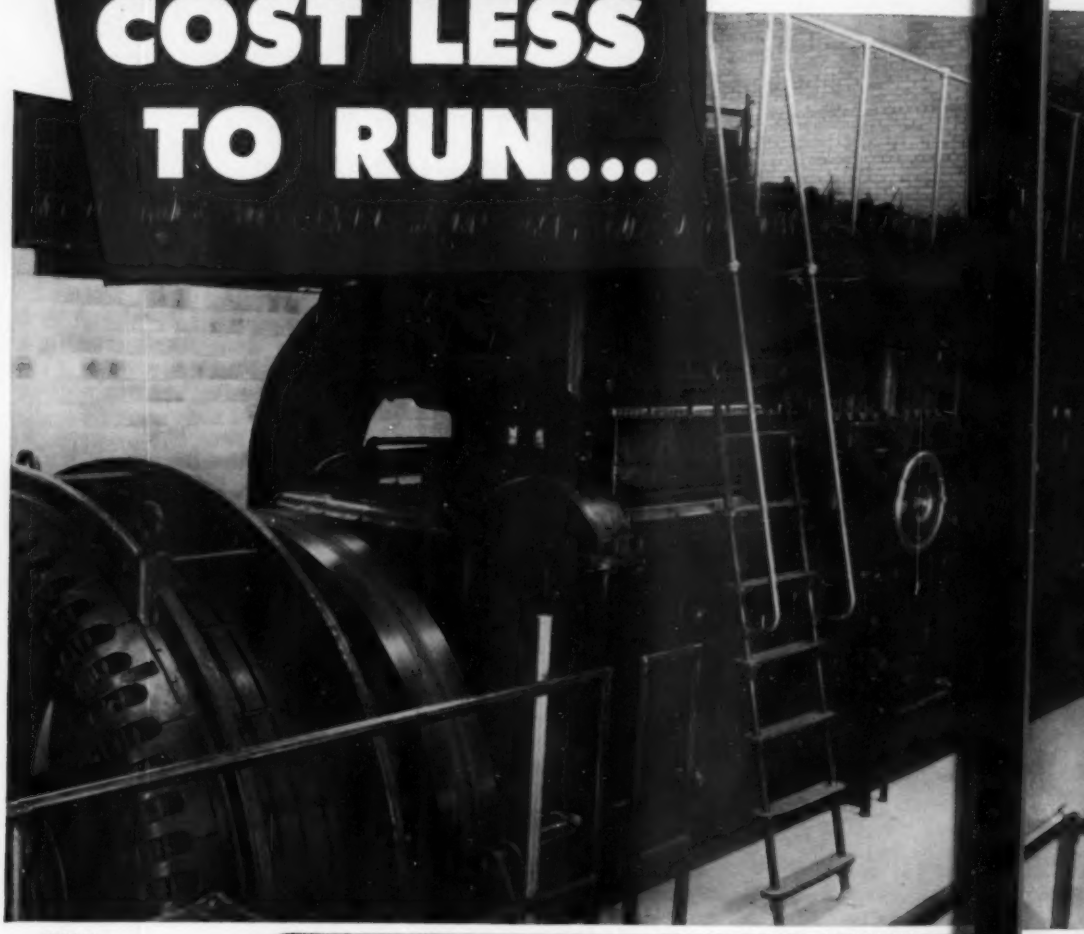
ENGINES COST LESS TO RUN... when



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every Tuesday night.
See newspaper for
time and station.

TEXACO

TEXACO

DIESEL PROGRESS for October, 1951, Volume XVII, No. 10. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 816 North La Cienega Boulevard, Los Angeles 46, California. Rex W. Wadman, President. Subscription rate: $5 per year, single copy, 50c. Acceptance under 34.64, P. L. & R., authorized.

lubricated with

TEXACO URSA OIL

Diesel, gas and dual-fuel engines run smoother, produce more power and cost less to maintain when you lubricate them with *Texaco Ursa Oil*. Power-robbing carbon, gum and sludge don't have a chance to form because *Texaco Ursa Oil* keeps engines *clean*. Rings stay free, ports stay clear and valves function properly . . . assuring better compression and combustion . . . less fuel consumption.

Texaco Ursa Oil resists oxidation . . . stands up under extreme heat and pressure . . . assures longer parts life. Switch to *Texaco Ursa Oil* and join operators everywhere who report increased power and worthwhile maintenance savings.

There is a complete line of Texaco Diesel lubricating oils, available in every needed viscosity, and approved by leading engine builders. These oils are No. 1 in popularity. For example:

> More stationary Diesel h.p. and more railroad Diesel locomotives in the U. S. are lubricated with Texaco than with any other brand.

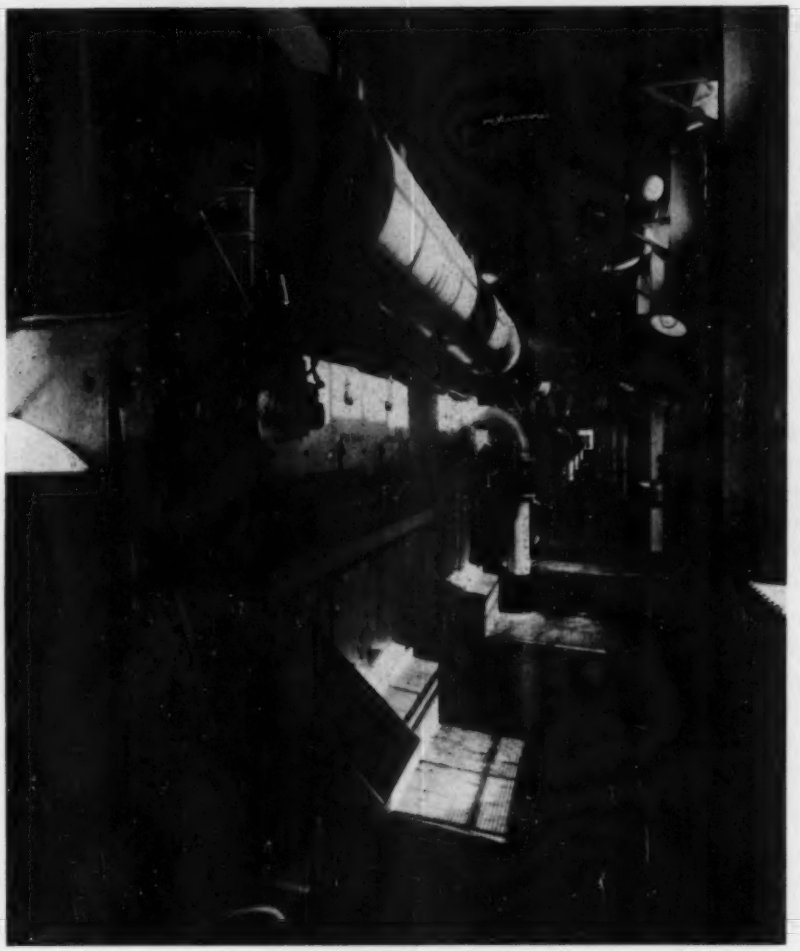
Let a Texaco Lubrication Engineer work with you to cut down costs throughout your plant. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Photo courtesy Fairbanks, Morse & Co.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

Installation of Clark Bros. Co. Gas Engine Driven Compressors In Cycling Plant of Sun Oil Co.



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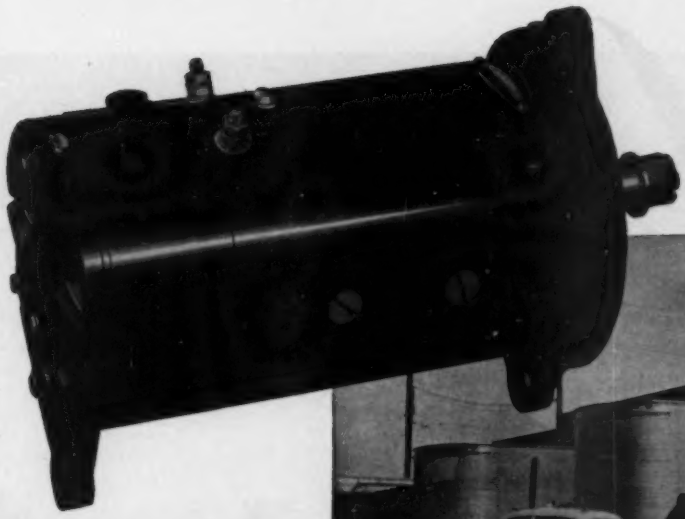

Delco-Remy heavy-duty 12 volt, 50 ampere generator.

SERVING THE DIESELS THAT SERVE AMERICA...

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DELCO-REMY—A UNITED MOTORS LINE
Service Parts and Delco Batteries
Available Everywhere Through
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Diesel-powered tractors continue to roll up per-ton-mile economy records in the freight haulage business.

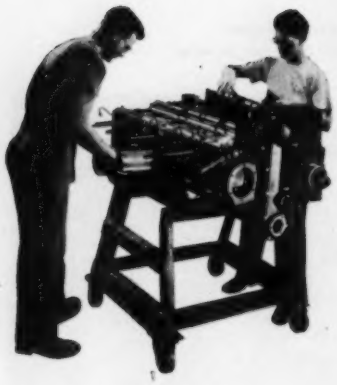
Delco-Remy electrical equipment on the Diesels continues its remarkable record of dependable performance.

Since the earliest days, Delco-Remy has been privileged to serve the Diesels that serve America. Today, Delco-Remy electrical equipment is the standard of the industry.

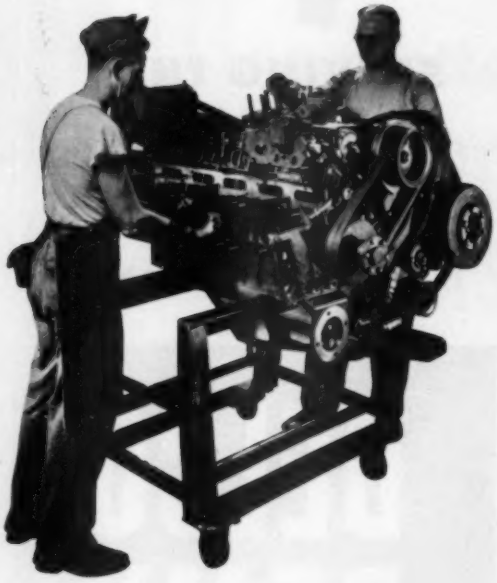
Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION
ANDERSON, INDIANA

DELCO-REMY · WHEREVER WHEELS TURN OR PROPELLERS SPIN



Cummins®
CUSTOM BUILT
Diesels



BUILT NOT ONCE BUT TWICE!

You get more power and profits with Cummins Diesels. They're custom-built to fit your job, and your equipment. And they are literally built *not once but twice*. Each engine is assembled, run-in tested, disassembled . . . inspected, reassembled and *tested* again. Such precision building, Cummins exclusive fuel system, efficient service and parts organization . . . mean *less* "down-time" and *more* profitable power for every Cummins Diesel Engine. *See your Cummins dealer.*

Lightweight High-speed Diesel Engines (50-550 hp) for: on-highway trucks • off-highway trucks • buses • tractors • earthmovers • shovels • cranes • industrial locomotives • air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units • work boats and pleasure craft

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U.S.A. • Cable: CUMDIEX

Diesel power by CUMMINS

CUMMINS Specialized DIESEL

TRADEMARK REG. U. S. PAT. OFF.

New diesel...Old story

• When the city of Garnett, Kansas, placed this 1,400-HP diesel in service in the municipal power plant early in 1948, STANDARD HD Oil was the logical choice for a lubricant. The superior performance of Standard fuels and lubricants was already an old story to operators at Garnett, since they had been used for over 20 years in the plant's other generating equipment. One diesel, for example, has logged over 70,000 hours and is still running with the original pistons. A set of rings consistently delivers over 20,000 engine hours.

Since installation of the new equipment, lubrication has been trouble-free and exceptionally economical with consumption averaging better than 9,000 HP-hours per gallon of lubricant consumed.

A Standard Oil lubrication specialist can help put STANDARD HD Oil to work to your advantage in your own diesels. For his services, call the Standard Oil Company office in your own area, or write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

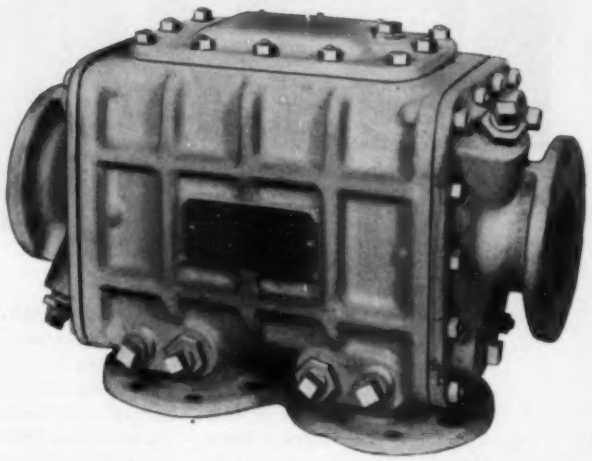
STANDARD HD
TRADE MARK
OIL

STANDARD OIL COMPANY STANDARD *(Indiana)*

Solve your cooling problem with a HARRISON Heat Exchanger

Harrison heat exchangers—
oil coolers, water coolers—
are tailored to their jobs.
They combine high capacity
with real compactness—
a combination that means much
to designers and engineers.

Diesel engine manufacturers
have learned
that they can depend
on Harrison units
to do any cooling job—
and do it *right*.
They know, too,
that Harrison's engineering,
manufacturing,
and testing facilities
are always available to them.



HARRISON

HARRISON RADIATOR DIVISION
GENERAL MOTORS CORPORATION
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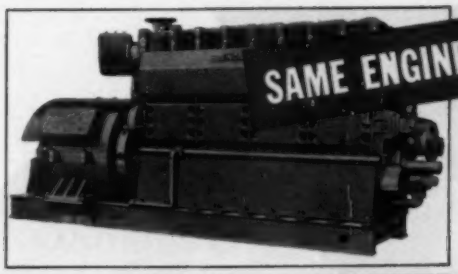

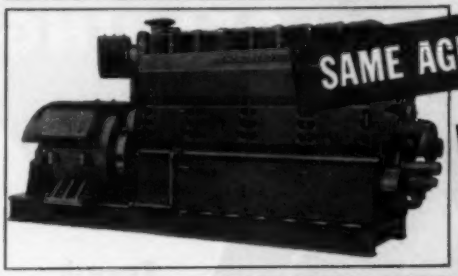

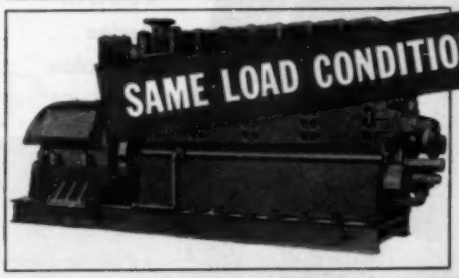

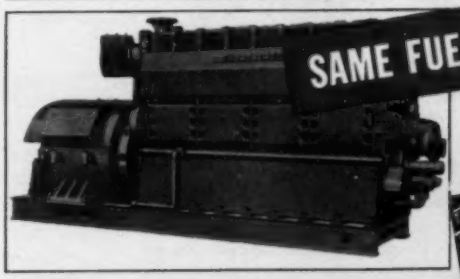

Yet Lubrication is Different!

Yes, it's not unusual. From the first day in service, every engine begins to develop its own lubricant "diet." Frequently it's a matter of care and attention given by the operator. Often it's caused by geographic or climatic differences. Certainly, no two engines ever built performed identically . . . wore out at the same time . . . or required the same amount and kind of lubricant for best performance.

For these reasons *your* Diesel engine investment should be protected with regular lubrication engineering service. A Cities Service representative is highly skilled, highly trained and thoroughly familiar with the lubrication requirements of every type of Diesel equipment. Moreover, behind him stands an alert, completely integrated oil company with a full line of top quality industrial lubricants. Contact the office nearest you or write below for further information.

A Complete Line of Top Quality Petroleum Products Including:

- **New Heavy Duty Diesel Oils**
- **New Low Speed Diesel Oils**
- **Exclusive Diesel Engine Oils**
- **Exhaust Analyzer Service**

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CITIES SERVICE OIL COMPANY
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Please send me without obligation your new booklet entitled "Diesel Engine Lubrication."

Name _____

Company _____

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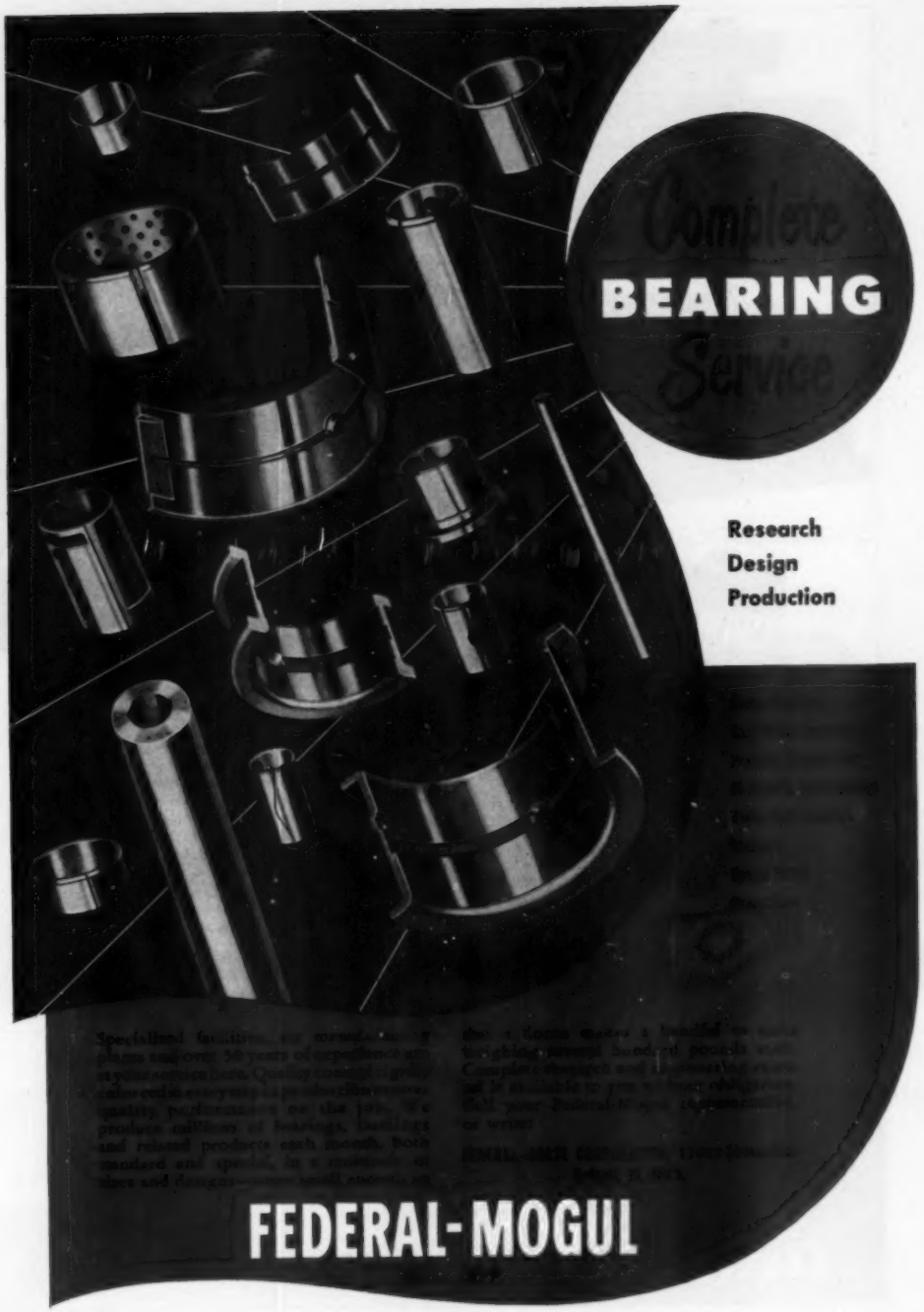
Complete
BEARING
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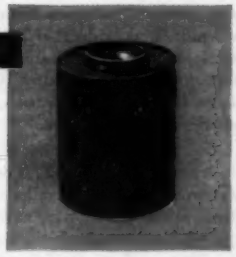
Design
Production
FEDERAL-MOGUL

AC

OIL FILTERS

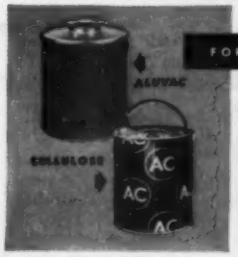
Protection PLUS *for Diesels*

FOR FUEL FILTERS



As protection for fuel injectors and transfer pumps, AC Elements are unequaled. They are engineered for factory-equipment Diesel fuel filters—and are precision-built to AC's highest quality standards. These AC Elements have been proved by millions of hours of service. Your engines need this *plus* protection to assure reliable operations.

FOR LUBE OIL FILTERS

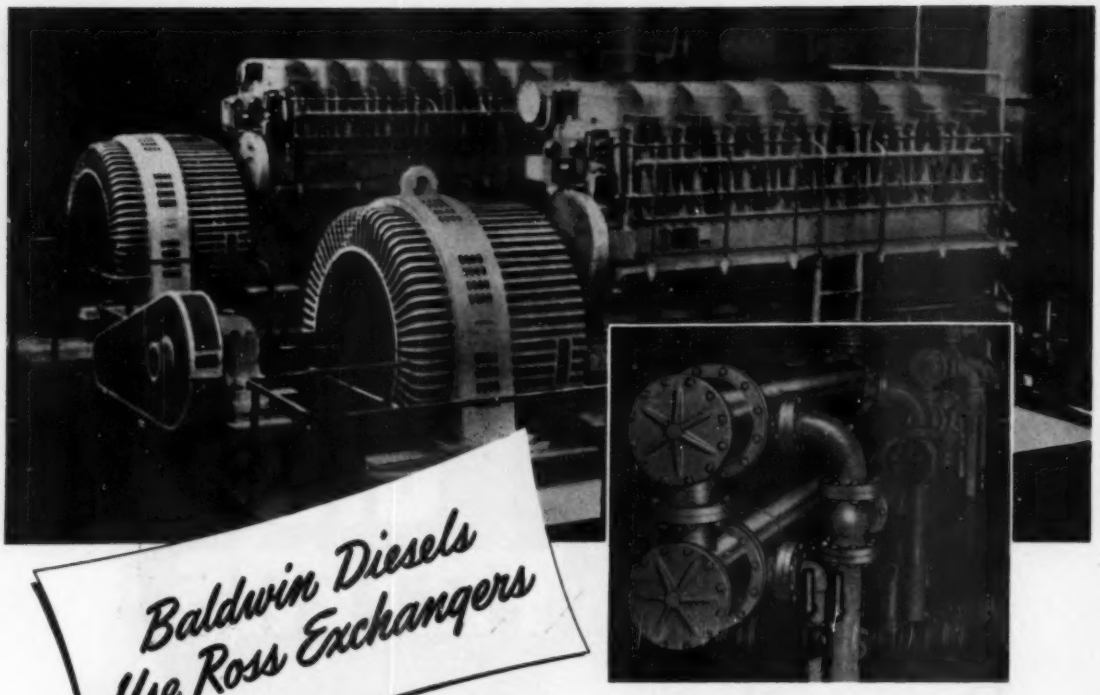


AC Lubricating Oil Filters and Elements are standard equipment on GMC Truck and Coach, Flexible Bus and Detroit Diesel engines.

Replacement elements are available for nearly every make of lubricating oil filter—some made of cellulose and some of AC's new *Aluvac* filtering material. Either type gives your engines protection *plus*.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION

"ONLY *CLEAN* OIL IS *SAFE* OIL!"



Baldwin Diesels Use Ross Exchangers

for simplified piping, facility in controlling engine lube oil and jacket water temperature

Mecca of vacationists from all over the world, in the center of the Adirondacks often referred to as America's Switzerland, Saranac Lake, is also distinguished in power circles for its commendable diesel electric installation.

For here, two Baldwin diesel electric generating sets consisting of two Baldwin Model 600 Diesels, 1450 bhp at 600 rpm each, direct-connected to generators with capacities of 1250 kva, 1000 kw and 2300 volts have solved, at a moderate cost, a growing power shortage during the peak-load, dry season.

Among the many distinguished features of this ideal installation is the compact, simplified, easily controlled engine cooling system which utilizes four Ross Type CP Exchangers, one for maintaining most effective operating temperature of the lubricating oil and one for the jacket water of each engine. Because the Ross Type CP is a pre-engineered exchanger, made up from fully standardized, mass-produced components and subassemblies, considerable engineering time was saved, while individualized fabrication was eliminated . . . *advantages that are attractive not only to Baldwin-Lima-Hamilton Corporation, but to most builders of diesels and compressors.*

But, the big point is not the fact that this installation is at Saranac Lake, N. Y. It could well be a diesel application of a larger or smaller rating for an oil field, pipeline, mine, locomotive, sawmill, factory or chemical plant. No matter which, no matter what the make, you'll generally find on the equipment list: "Exchangers by Ross". *Diesel builders have too much at stake — they must KNOW the exchanger can be depended upon!*

To obtain full details on the Ross CP, write for Bulletin 2.1K1 and consult with your nearby Ross representative.

ROSS

EXCHANGERS

ROSS HEATER & MFG. CO., INC.

Division of American Radiator & Standard Sanitary Corporation

1425 West Avenue **Buffalo 13, N. Y.**

In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

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Cutaway view showing typical cylinders, pistons and valves in a two-cycle, 1500 hp railroad Diesel engine with Uniflow scavenging.

effective detergency **-keeps engines cleaner**

lasts longer **-extends oil change period**

provides better protection **-insures less wear, lower maintenance costs**

GULF Dieselmotive oil provides the kind of lubrication that means higher availability and lower maintenance costs for railroad Diesel locomotives.

The effective detergent action of this quality lubricating oil prevents deposit of sludge- and varnish-forming materials — keeps piston rings and valve stems free, helps you avoid cylinder head changes and other maintenance measures.

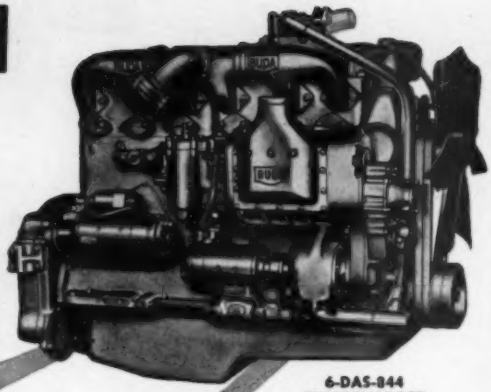
Gulf Dieselmotive Oil has outstanding resistance to oxidation and sludging which means longer, useful life. Thus you make a saving in lubricant costs. And it is noncorrosive to silver and alloy bearings.

Diesel locomotives in both main line and switching service are setting maintenance records with Gulf Dieselmotive Oil that are hard to beat. To get the advantage of this outstanding Diesel lubricating oil in your engines, call in a Gulf Lubrication Engineer today. Write, wire, or phone your nearest Gulf office. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh, Pennsylvania.

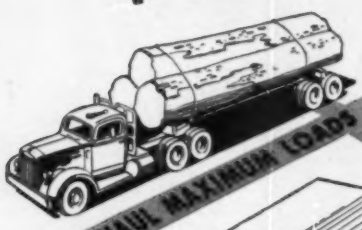
FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

BUDA POWER...

IS EARNING POWER!



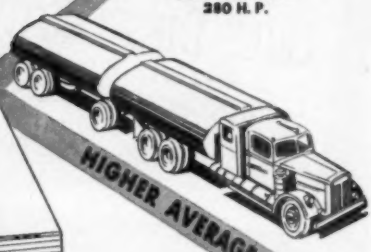
6-DAS-844
SUPERCHARGED
280 H. P.



HAUL MAXIMUM LOADS

MORE MILES BETWEEN OVERHAULS

LOWER MAINTENANCE



HIGHER AVERAGE SPEEDS

Install or Specify BUDA dyna-swirl Diesels for more Profits per ton-mile

Buda dyna-swirl Diesels give you:

- 10-15% more torque—lugging ability
- 13-25% more piston displacement
- Average 180,000 to 200,000 miles between overhaul
- Less "nick-nack" maintenance

Compare the positive money-making advantages of Buda dyna-swirl Diesels against any other engine. Check every feature and see why Buda Diesels guarantee more profits per ton-mile. Ask your nearby Buda Distributor for the facts. Write for Bulletin 1506 and specification data today.

The Buda Company, Harvey, Illinois

BUDA

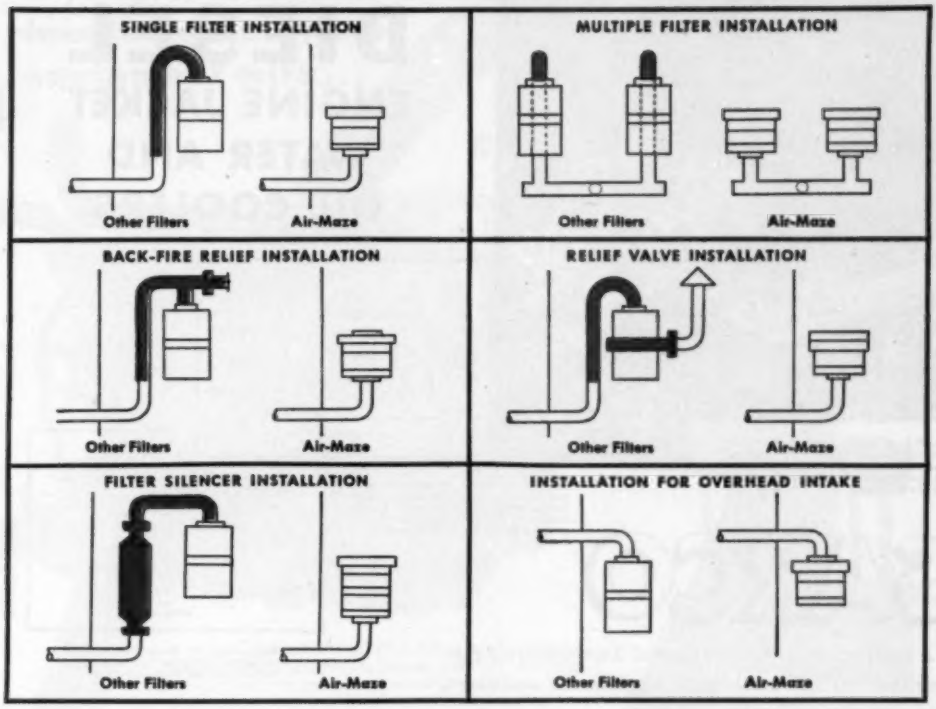
a Power-Full and Dependable Name in Engines

BUDA
COAST TO COAST
FACTORY EXPERIENCED
SERVICE AND PARTS

SA-74

Manufacturers of Diesel and Gasoline Engines, Maintenance of Way Products, Lifting Jacks, Earth Drills and Material Handling Equipment

How Air-Maze oil-bath air filters save space, piping and money



THE COMPARISON SKETCHES above show how you can save with Air-Maze oil-bath air filters. Air-Maze oil-bath filters need less piping and are easier to install. Material and labor costs are reduced. Because Air-Maze oil-bath filters are more compact, you save on space.

Air-Maze filters give you peak operating efficiency, too. To stop abrasive dust and dirt, intake air is passed through an oil-filled bowl, then through an oil-washed filter media. The air is literally "scrubbed" before it reaches engine parts. Wear and overhaul costs are sharply reduced.

Thousands of Air-Maze installations have proved themselves in performance and value. Today, Air-Maze filters are used by practically every leading diesel engine manufacturer and by most manufacturers of large air compressors. For full information on the hundreds of filter types and sizes *engineered* by Air-Maze, write the Air-Maze Corporation, Cleveland 5, Ohio.

The biggest names in diesels are protected by Air-Maze filters

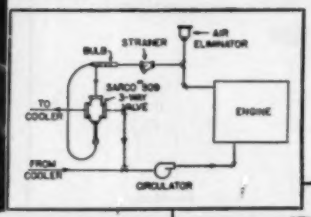
AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
THE FILTER ENGINEERS

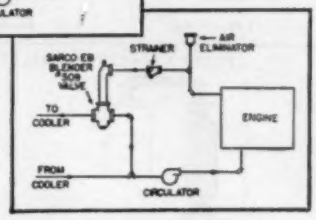
LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

Cooling Controls for DIESEL ENGINE JACKET WATER AND OIL COOLERS

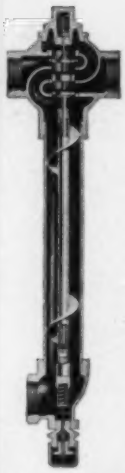
2—4" Sarco, type TR-21-509M, Cooling Controls on Fairbanks-Morse Diesel engine at Seaford Light and Power Company, Seaford, Delaware. Valve fitted with special springs to permit installation with inlet from below.



Sarco type TR-21 Regulator with three-way valve controlling engine jacket water temperature on a large Diesel. A varying portion of the cooling water is re-circulated.



Sarco, type EB Water Blender controlling Diesel jacket water temperature by partial re-circulation.



Sarco type EB Water Blender, a mixing valve with built-in liquid-expansion thermostat for recirculating control. Available in iron body or all brass construction for temperatures to 200° F., valve sizes ½" to 6".

SARCO

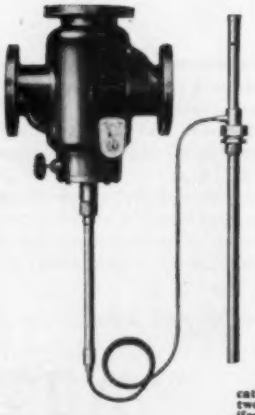
Sarco offers a complete line of self-operated Temperature Regulators for use on internal combustion engines for stationary, marine and locomotive application.

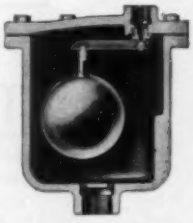
Their distinguishing feature is the exclusive use of

Liquid Expansion Systems

There are no critical vaporizing temperatures. Ranges can begin at any desired temperature. The power for moving the valve is uniform per degree temperature rise at any point of the scale. There are no stuffing boxes to leak or stick. Packless seals, using Sarco helical bellows, provide frictionless valve movement. Completely balanced valves assure fully floating control.

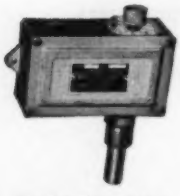
For complete information ask for Catalog 703.



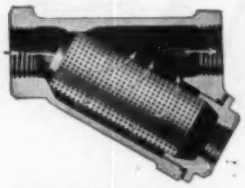


Sarco Air Eliminator for preventing air pockets at high points in cooling circuits. Type 13W with ½" inlet, Type 14W with 1" inlet.

Sarco type TR-21 Cooling Control, shown with No. 509-M balanced, positive seating three-way recirculating valve. Manual opener and valve position indicator optional. Furnished also with two-way piston valves, direct acting (for by-pass control) or reverse acting for direct cooling. Valve sizes ½" to 2" incl. No. 502, 2½" to 6", No. 503.



The Sarco line includes electric temperature and pressure switches for alarm systems.



Protect regulators against damage from dirt, rust or scale with Sarco Pipe Line Strainers. Prevent costly shutdowns and heavy repair bills.

361

SARCO COMPANY, INC.
EMPIRE STATE BUILDING, NEW YORK 1, N. Y.
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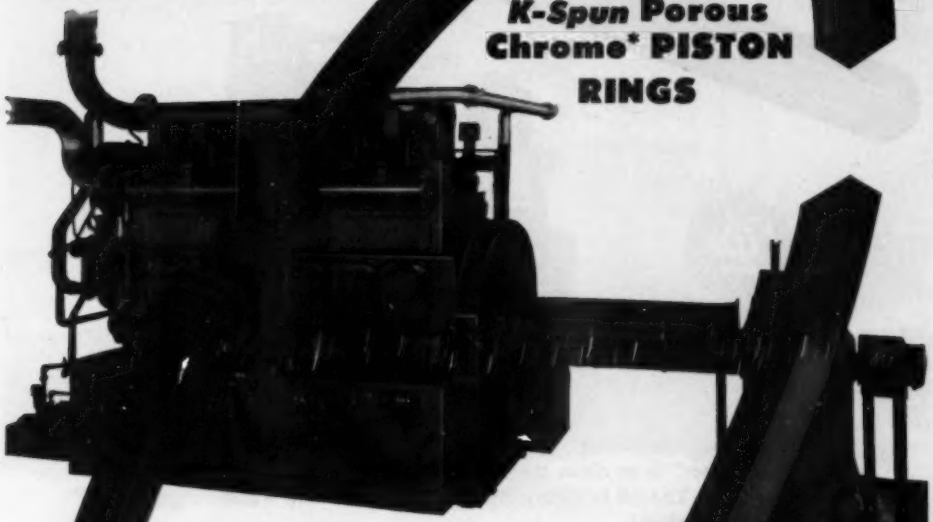
UNION OIL COMPANY cuts cylinder wear, lengthens service of equipment with...

...KOPPERS *K-Spun* Porous Chrome* PISTON RINGS



Koppers K-Spun Piston Rings, produced by an exclusive centrifugal casting process, are 100% stronger and four times more resistant to combustion shock than ordinary cast iron rings, and will not break in installation or in service.

Koppers Porous Chrome Rings have a porous chrome surface that holds and distributes oil during break-in, quickly wears down to perfectly seated solid chrome that prevents grit and other particles from embedding in the ring surface where they can scratch cylinder walls. Porous Chrome Rings last up to four times as long as other rings, reduce cylinder wear 50% or more.

That's why hundreds of companies like Union Oil are reporting amazing savings in equipment and maintenance costs through the use of Koppers Rings. Remember . . . we make rings for *anything* that uses piston rings.

If you have a piston ring problem, why not get the *right* answer from us? Write, wire or phone KOPPERS CO., INC., *Piston Ring Dept.*, 1680 Hamburg St., Baltimore 3, Maryland.

Union Oil Company's newly modernized Avila (California) Terminal utilizes three 480 h.p. Enterprise dual-fuel engines with single-stage Ingersoll-Rand SHV centrifugal pumps. Engines are 6 cylinder, 12" bore, 15" stroke, 4 cycle, 450 rpm, non-supercharged. Each piston is fitted with two Porous Chrome, three tapered and two ciricular Koppers Piston Rings.

KOPPERS

KOPPERS

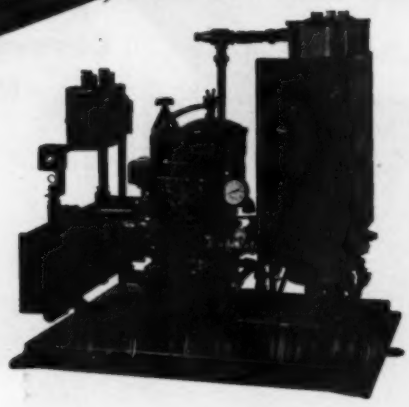
AMERICAN HAMMERED

PISTON RINGS

*VAN DER HORST PROCESS

ONLY KOPPERS CAN FURNISH K-SPUN OR POROUS CHROME!

"PURI-FILTERED" OIL [illegible] CLEAN
YOU CAN RE[illegible]HROUGH IT!



Diesel lubricating oil that has been cleaned by a De Laval "Puri-Filter" is so clean that you can read a book through a test tube full. The oil is ***visibly*** clean — no dirt . . . no water . . . no colloidal carbon!

The "Puri-Filter" cleans oil two ways: (1) by centrifugal force, (2) by micronic filtration. First the De Laval centrifuge removes solid impurities and water, storing the dirt in the bowl of the machine and continuously discharging the water to waste. Then the lubricant is further purified by means of the filters which remove the specks of carbon that are lighter than the oil itself. You ***know*** that the oil going back to the crank case is clean.

De Laval "Puri-Filters" are complete, ready-to-run units. They are available in various capacities.

THE DE LAVAL SEPARATOR COMPANY
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DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL *Oil Purifiers*

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Designed by Tams, Inc. Built at Gulfport Shipbuilding and Drydock Corp. Owners, Esso Standard Oil Co. Length, 100 ft. Breadth 25 ft. Molded Depth, 12 ft., 11 in. Powered by 12-278A, 1800 b.h.p.

Another Diesel-Electric Tug in the Esso Fleet

When boatmen talk power—performance—dependability —they mean GM Diesel-Electric Drive every time.

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Leader in Diesel engineering development for 39 years

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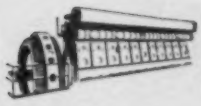
BALDWIN-LIMA-HAMILTON

BALDWIN LIMA

ACTION"



helps HAMILTON squeeze more horsepower from fuels

One of the very few large diesels completely redesigned since the war is the new Hamilton 21-SA. As a result, it includes all those new engineering advancements that mean *more horsepower* from every drop of fuel.

Take the scavenging and combustion system, for instance. It's new . . . *and completely different.*

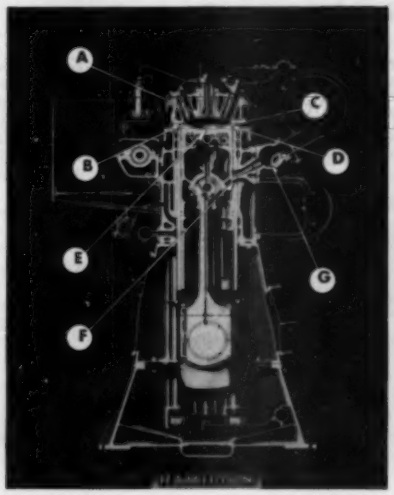
Exclusive rotary valves, a semi-hemispherical combustion chamber made by a cup-topped piston and recessed cylinder head, proportioned porting and an annular wall chamber, *trap 40% more air in the cylinder.* Then combine to squeeze this extra air into the fuel spray cone just as the piston reaches top dead center and as combustion is getting started.

That's "Squish Action!" . . . the secret of the better efficiencies of the Hamilton 21-SA.

Which in turn explains why this Hamilton 21-SA diesel gives *more horsepower* per cylinder size and speed than any other equivalent engine. And why it can burn the heaviest fuel with a clean exhaust . . . give the same output ratings on *both* dual fuel and diesel cycles.

Yet this is just one of the unusual features of this unusual diesel. So why not get in touch with us for *complete* information. There's no obligation.

Hamilton 21-SA diesels are available for marine or stationary applications either dual fuel or straight diesel. Built 5 to 12 cylinders with output range from 2250 to 6860 hp. at 240 to 277 rpm.



A. Recessed Cylinder Head

B. Flat on Cylinder Head

C. Annular Space

D. Flat on Piston Crown

E. Cupped Piston Crown

F. Looped Scavenging System with Proportioned Porting

G. Exclusive Rotary Valve

MORE POWER — LESS FUEL
CLEAR, COOLER EXHAUST

RPORATION Hamilton, Ohio

HAMILTON

Exhaustive ENGINE TESTS Prove

ALL 5 CLRC TESTS, standardized by the Co-ordinating Lubricants Research Committee, prove Shell Rotella Oil superior to the average of leading diesel lubricants . . . from every critical standpoint: parts-wear, corrosion resistance, ring-sticking and piston fouling.

Moreover, further tests, such as the Modified Lauson Lacquer Rating Test and Shell's own extremely severe Four Ball Test . . . all add proof upon proof that Shell Rotella Oil *does* keep engines clean longer . . . *does* extend time between overhauls . . . *does* reduce parts wear.

FLEET SERVICE confirms engine test results!

Read these authorized reports:

Yellow Cab Company, Nashville, Tenn., has 75 cabs, running 24 hours daily. They write: "We have always had trouble with sludge forming in the crankcase of our motors due to the constant start and stop driving . . . On some cabs this sludge completely blocked the passage of oil through the pump screen . . . bearings were burned out.

"After months of operation on Shell Rotella Oil we are glad to report that the *motors (thus far) examined have been found entirely clean, the pump screen as bright as brand new, and we have had no bearing trouble of any nature.*"

Creston Transfer Company, Grand Rapids, Michigan, haul uncrated furniture to the East Coast and southern cities. Creston began using Shell Rotella Oil nearly 4 years ago to correct a serious overhaul problem due to short valve life in their trailer truck engines. Shell Rotella Oil has increased valve life from 8,000 miles to better than 40,000 miles and greatly reduced all-around maintenance costs. Creston Transfer is now expanding with hauls to nearly every state. The proved lower maintenance through using Shell Rotella Oil is a basic part of Creston's expansion planning.

SHELL ROTELLA OIL . . . EXTENDS

You can EXTEND TIME between overhauls...

SHELL ROTELLA OIL slashes maintenance costs—Maintains engine efficiency

1. Positive ANTI-ACID ACTION

Shell Rotella Oil drastically reduces wear in the vital top-cylinder zone by counteracting the acid action of unburned fuel particles. This protection is extremely important in engines with intermittent loading.

2. Constant DISPERSANT ACTION

The excellent dispersant properties of Shell Rotella Oil permit it to dissolve contaminants and hold them in suspension until draining time. This prevents premature fouling.

3. Maintained Engine Efficiency

Is the direct result of reduced top-cylinder and ring-face wear. Moreover, new or reconditioned engines operating with Shell Rotella Oil show a welcome extension of the "low oil consumption" period because of this same reduced wear. The above gains, combined with freedom from fouling and a significant increase in valve life, enable you to extend time between engine overhauls.

FLEET OPERATORS!

Shell Rotella Oil is "Barrel One" in Shell's famous Three-Barrel Plan for fleet lubrication

If you want to cut lubricant inventories to the bone . . . to realize savings in time, labor and materials . . . mail this coupon for "The Three-Barrel Plan." It's a practical booklet that shows how this revolutionary lubrication program can cut your maintenance costs.

NOW!
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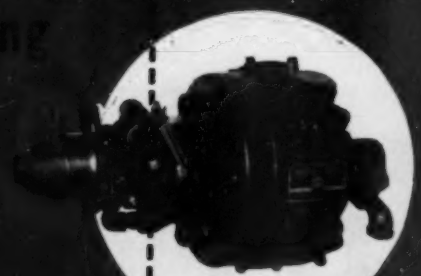
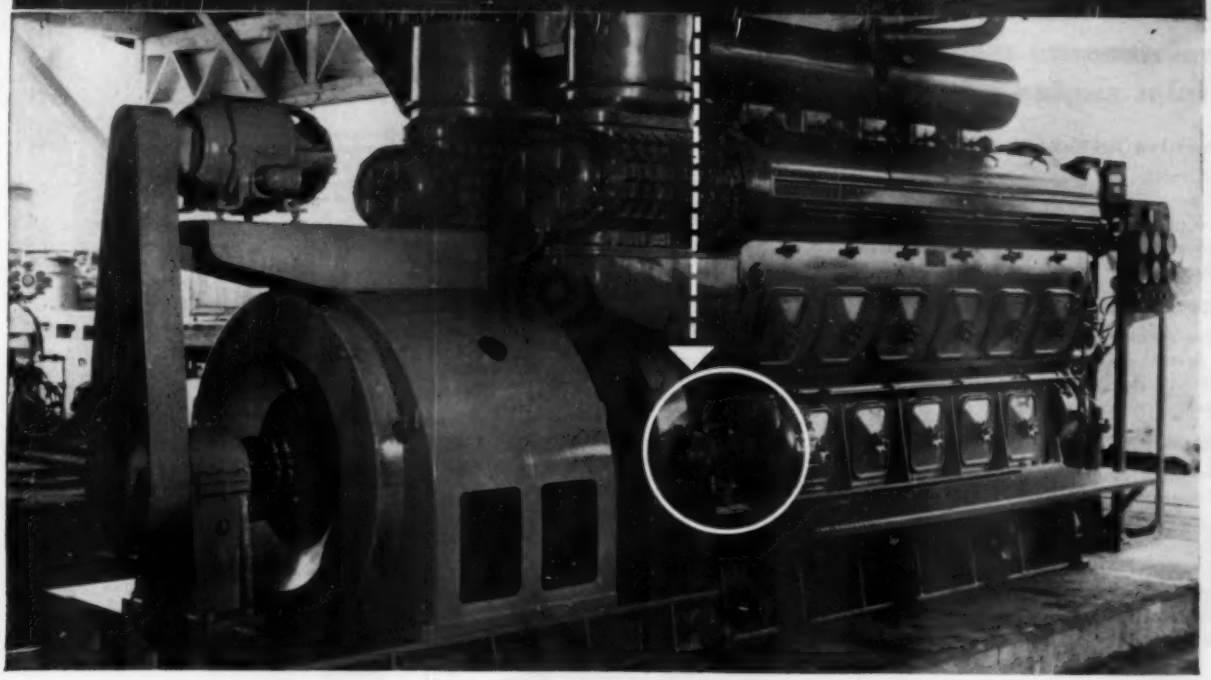
TIME BETWEEN OVERHAULS!

1125 horses start pulling when this GARDNER-DENVER MIDGET says, "giddap"



Gardner-Denver Air Starters — 3 to 15 h.p.



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A CHOICE OF TWO PULSATION DAMPENERS TO SOLVE YOUR PARTICULAR PROBLEM!

A FUNDAMENTAL PULSATION DAMPENER

In 1943, The Fluor Corporation pioneered the development of pulsation dampeners. The first U. S. Patent covering pulsation dampeners designed specifically for the removal of gas stream pulsation and subsequent vibration in compressor piping was issued to Fluor in 1946.

Continued research in gas pulsation and its associated problems has established that pulsation, and its intricate secondary vibration, can be attributed to both fundamental and high frequency pulsations *—or to high frequency components alone.*

Whichever of these destructive conditions exists in your plant, Fluor offers a dampener engineered to fit the requirements of the specific problem. Fluor—and only Fluor—offers such a complete range of pulsation dampeners. For this reason you can be assured of an unbiased recommendation on the best type dampener for your *particular* requirements.

THE FLUOR FUNDAMENTAL PULSATION DAMPENER

This type dampener smooths out all pulsations in the gas stream to the extent of at least 85%. All harmonics originally set up in each pulse cycle are automatically reduced or eliminated. This dampener is the guaranteed answer in plants where structural vibration and metering difficulties are encountered irrespective of pulsation frequency.

MAKE YOUR OWN PRELIMINARY SURVEY

In many cases you can make your own preliminary survey to determine roughly if your pipe vibration is caused by pulsations. Write The Fluor Corporation, Ltd., Los Angeles 22, California, indicating layout of compressor house piping and operating pressures. A procedure will be mailed to you promptly. No obligation.

THE FLUOR HIGHER FREQUENCY PULSATION DAMPENER

This dampener removes objectionable pulsation frequencies encountered above the fundamental. In many instances, it has been found that metering difficulties and vibration of compressor piping and nearby vessels have been caused by the higher frequency components alone. Available in both manifold and in-line types, this dampener is competitive in cost with muffler or snubber type devices.

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"Pulsation Phenomena in Gas Compression Systems"
By I. C. Bucknell, *Director of Research and Development*

Abstract: Pulsation phenomena in gas transmission lines leading to and from gas compressor stations are described along with a description of the mechanical vibration induced from the pulsative flow.

"Effect of Pulsation on Gas Measurement"
By C. P. Yates, *Research Engineer*

Abstract: This paper discusses the effect of pulsative flow on the accuracy of measuring gas-flow rate by orifice meters. Data are presented showing the relationship between magnitude and nature of the pulse and the resultant readings recorded by the measuring instrument.

"Mechanical Vibration of Piping Induced by Gas-Pressure Pulsations"
By R. C. Runn, *Research Engineer*, and I. C. Bucknell, *Director of Research and Development*

Abstract: The generation and nature of gas-pressure pulses from reciprocating compressor action are described, together with the propagation of such pulses through pipe lines. The means whereby pulse energy is converted to mechanical vibration is discussed by the aid of analogous mechanical, acoustical, and electrical oscillatory systems. The economic importance of minimizing vibration in compressor and compressor-dependent installations is indicated.

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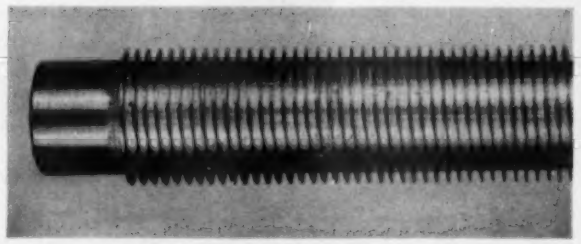
G-R Type LK-Fin Tubular Cooler with helically-finned tubes



Portion of LK-Fin heat transfer element used in the LK-Fin Cooler

G-R offers a choice of *two* efficient and reliable units for maintaining the lube oil and jacket water of your Diesel engines at the correct temperatures for best operating results.

If you have a sufficient supply of raw water, select the LK-Fin Cooler. This tubular exchanger has finned type cooling elements with four times the heat transfer surface of bare tubes. As a result, the LK-Pin Cooler is far more compact, besides being lighter in weight and less costly than bare-tube units for the same duty. In addition, the LK-Fin Cooler has several other distinctive features that provide effective design and long-lived construction with economical maintenance.

If your raw water supply is insufficient or undependable, the Fin-Fan Cooler will provide effective cooling by air. This unit, developed jointly by Griscom-Russell and Fluor Corp. Ltd., is in wide use on a great variety of cooling and condensing services. It operates entirely independent of the direction or velocity of the wind and may be installed wherever convenient, within a building, or on the ground, or on a roof.

The cooling elements of the Fin-Fan Cooler, like that of the LK-Fin Cooler, have helical fins originated by Griscom-Russell for more efficient cooling. This design, developed more than 25 years ago, has proven its effectiveness and durability in many tens of thousands of cooling and condensing units.

Write for complete data on whichever type of G-R Cooler best meets your cooling water conditions, and information will be sent you without obligation of any kind.

Fin-Fan Air-Cooled Heat Exchanger, showing G-R K-Fin Cooling Sections on top of the structure and with part of the side wall cut away to show the motor-driven fan

THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

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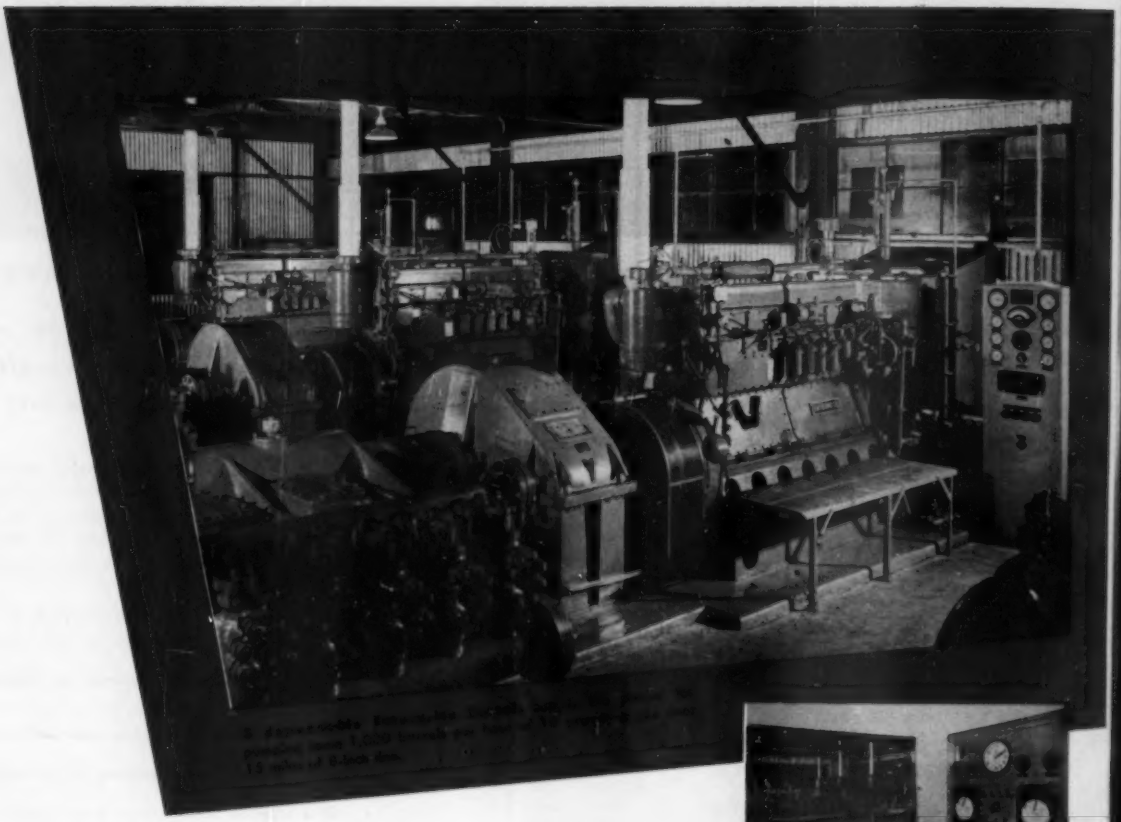
Crude Diet for Diesels



Plant view from central control room. This Enterprise Diesel-equipped pumping station is setting new records for operating economy.

New Enterprise Diesels burning crude oil picked up the load carried for 42 years by a steam plant—with no interruption of operations.

ENTERPRISE POWER FOR A 15 MILE UP-HILL BOOST

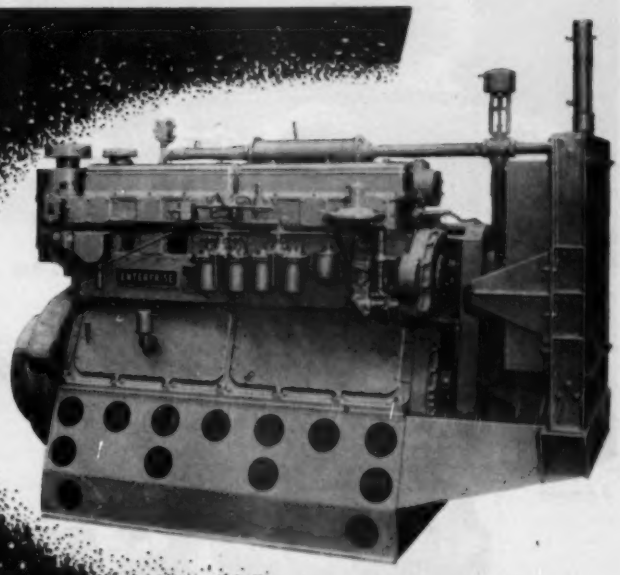
An innovation in pipeline pumping power, the *Enterprise* Diesels at Union Oil Company's Antelope Station have set new precedents for operating economy and self-sufficiency. Their ability to take unrefined 16-gravity crude from the pipeline and burn it cleanly and efficiently is the result of exhaustive testing and modifications of basic distillate fuel-burning engine models by the *Enterprise* research and development staff. This work was speeded through close collaboration with Union Oil Company's Research Department, and its contribution of specialized knowledge of fuel and lube oil abilities and properties.

As a result of the highly successful operations at Antelope Station, the pattern has been set for still another pumping plant modernization job at Union's Junction Station, which will be equipped with 6 *Enterprise* DSM-6's—also to operate on crude fuel tapped from the pipeline.

Pays Off

AT UNION OIL COMPANY'S NEWLY MODERNIZED PUMPING STATION NEAR BAKERSFIELD, CALIFORNIA

ENTERPRISE DSM-6 DIESELS BURN HEAVY PIPELINE CRUDE -SAVES 90% in fuel!



Rated 220 HP at 720 RPM, these rugged 6 cylinder Enterprise Diesels run on a diet of unrefined pipeline crude. Despite a viscosity of 800 to 1000 SSU at 122° F., a remarkably high combustion efficiency is maintained —even over extended periods at about half-load.

Replacing the steam pumping equipment which had been in operation for 42 years, modern *Enterprise* heavy fuel engines now drive pumps capable of delivering up to more than 25,000 bbls. per day. These heavy duty, medium speed pumping power units are equipped with heaters, strainers and filters which condition the crude fuel oil for uninterrupted flow through the injection system, and for high and steady combustion efficiency.

Distillate diesel fuel is used for a 15-minute warm up period, and again before shutting down to insure easy starting and clean operation. Fuel costs, as a result, have become a relatively insignificant part of operating overhead, with some 90% less fuel consumed during most of the year than was previously required to operate steam equipment.

These and many other features of *Enterprise* Diesels provide the most satisfactory solution for both new pipeline stations and modernization programs alike.

Write today for full information on *Enterprise* Diesels for pipeline pumping... *the Choice of Power Experts.*

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A honking flight of geese slicing effortlessly through the crisp autum sky . . . an objective in mind . . . Winter under warm Southern skies! Unerring accuracy, perfect coordination, instinctive, unbroken "V" formation to the objective. Here at Erie Forge our one objective is to produce diesel crankshafts, connecting rods, drive shafts and steel castings second to none in fine quality and lasting durability. An objective in mind . . . From careful metallurgical analysis of raw and processed material to skillfully applied experience in the principles of fine craftsmanship . . . and finally to the minute accuracy of the finished product . . . every operation is completely controlled and achieved within the walls of our own plants here at Erie Forge. Your requirements will receive our intelligent scrutiny and our earnest effort . . . will you consult with us?

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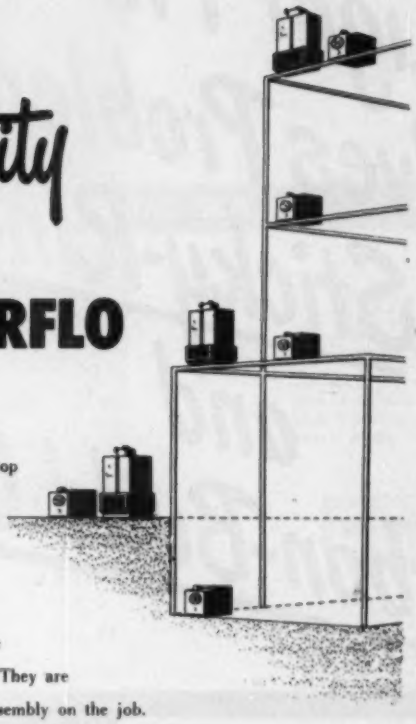

Indoors or out . . . on the ground or on the roof . . . on the top floor or in the basement—*there's a Marley cooling tower designed to fit any location and any cooling requirement.*

If your job is in the 3-ton to 60-ton range, you need an adaptable Aquatower—the compact, trouble-free cooling tower for indoor or outdoor use. Aquatowers are made in nine sizes and two styles to do each specific job economically. They are shipped completely assembled or "knocked-down" for easy assembly on the job.

In larger capacity installations the answer is a versatile Marley Vairflo . . . a broad range cooling tower with all the quality "extras" ordinarily found only in heavy-duty, high priced towers. The Vairflo, in steel or wood, harmonizes with architectural design. All material in Vairflos is completely prefabricated for simple job erection.

Whatever your need, select a Marley tower backed by the Marley guarantee and the "know-how" gained in more than 25 years of leadership in the water cooling industry. For more information, write for Marley bulletins AQ-51 and V-51, or call the Marley representative in your city.

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MARLEY

Light Plant Solves Problems of Sticky-Rings and Carbon-Build Up

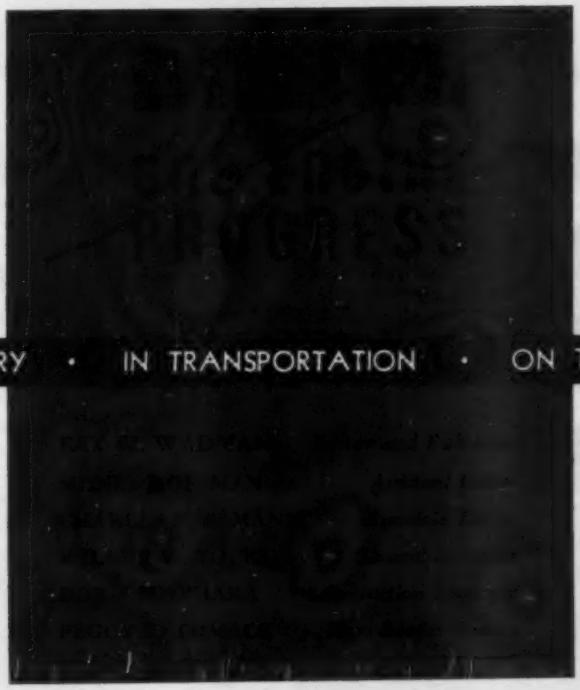
● For quite some time the Light Plant of Geneseo Municipal Utilities, Geneseo, Ill., had trouble with sticking rings, and with carbon deposits in the exhaust ports of its diesels. A few years ago these diesels were changed over to Sinclair *Gascon D*. Almost at once, it was noted that the troublesome conditions started to clear up. In the time since, sticking rings have become the rare exception and the carbon deposits are no longer a problem.

Furthermore, in 1947, a 1400 hp. Fairbanks-Morse engine, shown below, was installed and filled with *Gascon D*. This engine has never had a sticking ring and is running remarkably clean, with exceptionally low cylinder wear.

Perhaps *Gascon*® Oil can cure *your* diesel troubles, too. Get in touch with your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Ave., New York 20, N. Y.

Says Mr. Burgin, Superintendent of the Geneseo Municipal Utilities: "Sinclair GASCON has given us less varnish, less piston sticking, and a cleaner engine."

SINCLAIR DIESEL OILS *prolong engine life*



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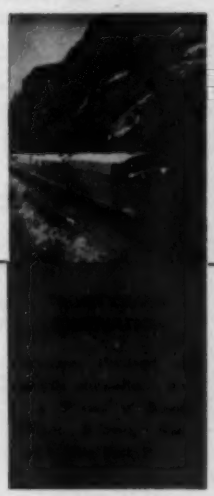
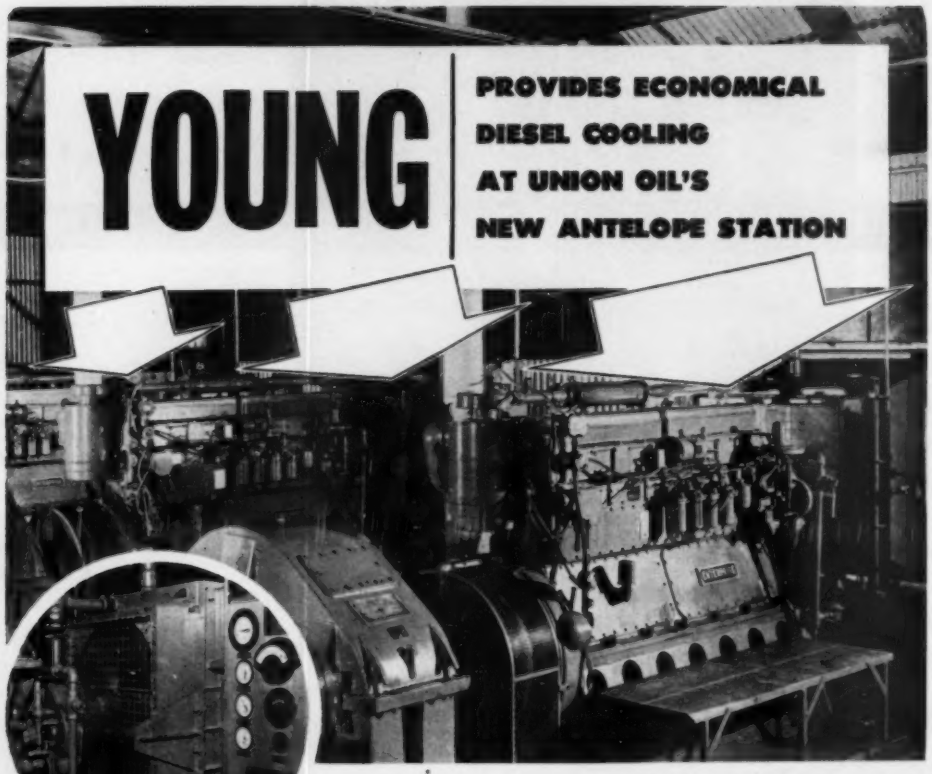
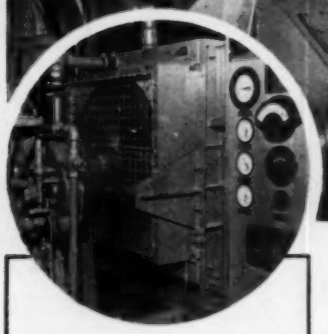


YOUNG

PROVIDES ECONOMICAL DIESEL COOLING AT UNION OIL'S NEW ANTELOPE STATION





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DIESEL DAY AT KINGSTON, ONTARIO

By WILBUR W. YOUNG

AUGUST 1 was "Diesel Day" in Kingston, Ontario when more than a thousand honored guests witnessed the unveiling of the first Consolidation, "C" line diesel-electric locomotive built by the Canadian Locomotive Company, Ltd. This, however, was the second milestone in Kingston's place in diesel history for it was here in 1928 that the first road diesel locomotive was built—the Canadian National Railway's No. 9000. Thus the recent occasion held more than ordinary significance, especially for those who remembered the advent of old 9000.

Highlight of the present occasion was the formal dedication and christening by the Rt. Hon. C. D. Howe, minister of trade and commerce and minister of defense production, of "The City of Kingston." Besides Mr. Howe more than 1000 special guests, including Hon. Leslie M. Frost, premier of Ontario, Robert H. Morse, Jr., president of the Canadian Locomotive Company and the chief executives of Canadian and United States railways were on hand for the celebration. By late in the afternoon thousands of citizens had passed through the cab of the 113 foot locomotive, the first of a fleet of 78 to be built in the Kingston works. The locomotive, painted in the maroon, grey and gold colors of the Canadian Pacific Railway and gay in its streamers of red, white and blue bunting is a two unit freight engine and the product of an expansion program at the Kingston plant that will run upward of $2,000,000. Red coated mounties and a smartly turned out outfit of sea cadets from HMSC Cataraqui ringed the area and assisted in various phases of the celebration as the speakers and special guests were introduced by John Fisher, CBC commentator who acted as master of ceremonies. In striking contrast to the sleek beauty of "The City of Kingston," an ancient, brass-bound hayburner—vintage 1872—stood mournfully nearby, its days of glory but a memory. Aboard were four pretty misses from the locomotive company's offices garbed in the colorful costumes of the period and their hair styled in the vogue of a long passed era.

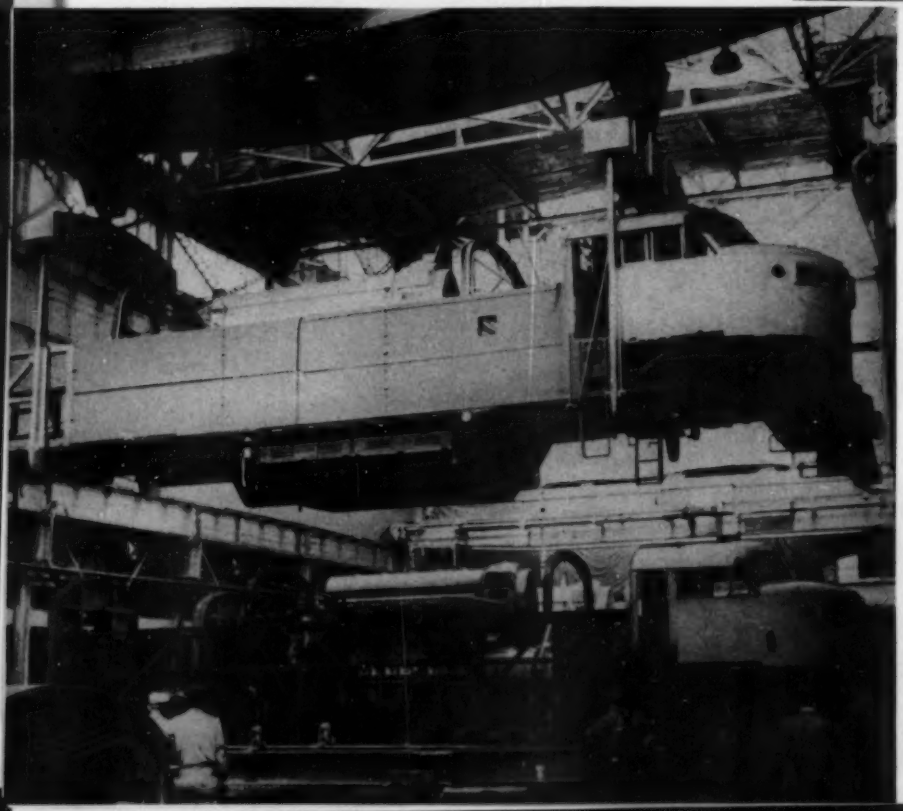
The official Diesel Day host, Robert H. Morse, Jr. of Chicago, in welcoming the guests, said "What we are recognizing today is essentially a Kingston achievement—and, in a broader sense, it is a Canadian achievement, shared in by dozens of Canadian companies who have supplied the essential components for our new locomotive. It's an achievement, too ,which testifies to the dynamic strength of the Canadian-American industrial partnership . . . a partnership vitally important to the future of freedom and the defense of our western ideals. Speaking now as an American businessman, it is my earnest hope that this partnership may be preserved and extended to the benefit of both Canada and the United States. May it continue to serve—as it has in the past—to strengthen the cultural and human ties which bind our countries together."

The new diesel—it can haul a fully loaded freight train at 65 miles an hour—was fittingly christened with champagne. The bottle, encased in 200 yards of red, white and blue ribbon and taken from a shining walnut chest, was broken on "The City of Kingston" by Mr. Howe. Afterwards the pieces were replaced in the chest and presented to the minister as a souvenir of the memorable occasion. Later in the afternoon it was "open house" at the CLC plant. Here other diesel locomotives in various stages of construction were seen as were the machines used in their manufacture. Descriptive cards were attached to the more interesting items. No pains were spared by CLC officials to make "Diesel Day" an outstanding event in the industrial history of Kingston. Special trains were operated to bring visitors to the city from both east and west. The company even went so far as to have special menus prepared for the travellers and all those who attended the ceremonies were presented with souvenir programs.

Three beautiful young ladies chosen from the office staff dressed in costumes depicting the times of old No. 40, hayburner of vintage 1872, greet the first "Consolidation Line" diesel-electric locomotive at Kingston in the Province of Ontario.

Reverend A. M. Laverty, Queen's University; Rt. Hon. C. D. Howe; and Robert H. Morse, Jr., President, Canadian Locomotive Company. The Christian spirit beams on the face of Rev. Laverty but there is a deep touch of doubt on the face of the Rt. Hon. Howe.

Giant 150-ton Morgan crane at the Canadian Locomotive Company's 13-acre plant at Kingston, Ontario, can lift a completed locomotive onto its trucks in the fascinating operation known to railroad workers as "wheeling." Here the crane is shown hoisting a partially assembled Consolidated diesel-electric locomotive.



The locomotive which creates as much electric power as a generator for a town of 5,000 people is 3,200 hp. and weighs 520,000 pounds. Like all CLC Consolidation Locomotives, it is powered by the Fairbanks-Morse Opposed-Piston Diesel engine which won fame in submarine service in World War II.

The Fairbanks-Morse 3200 hp. two-unit freight locomotive is the leader of a complete line of diesel-electric road locomotives manufactured at the Canadian Locomotive Company, Kingston, Canada. This line of locomotives offers power plant ratings of 1600 hp., 2000 hp. or 2400 hp. that can be installed in one basic structure with no change in general arrangement of the basic unit; hence, the name "Consolidation-Line" or "C-Line." The three horsepower ratings can be coupled in various combinations from 1600 hp. to at least 9600 hp. in a single locomotive. These first two units of this design built in Kingston combine to make a 3200 hp. freight locomotive. The larger equipment components such as air brake, electrical, main engine and auxiliaries, and the steam generator equipment have been definitely grouped in the general arrangment of th basic units so as to isolate maintenance functions.

The entire design is aimed toward interchangeability of all major assemblies between basic units

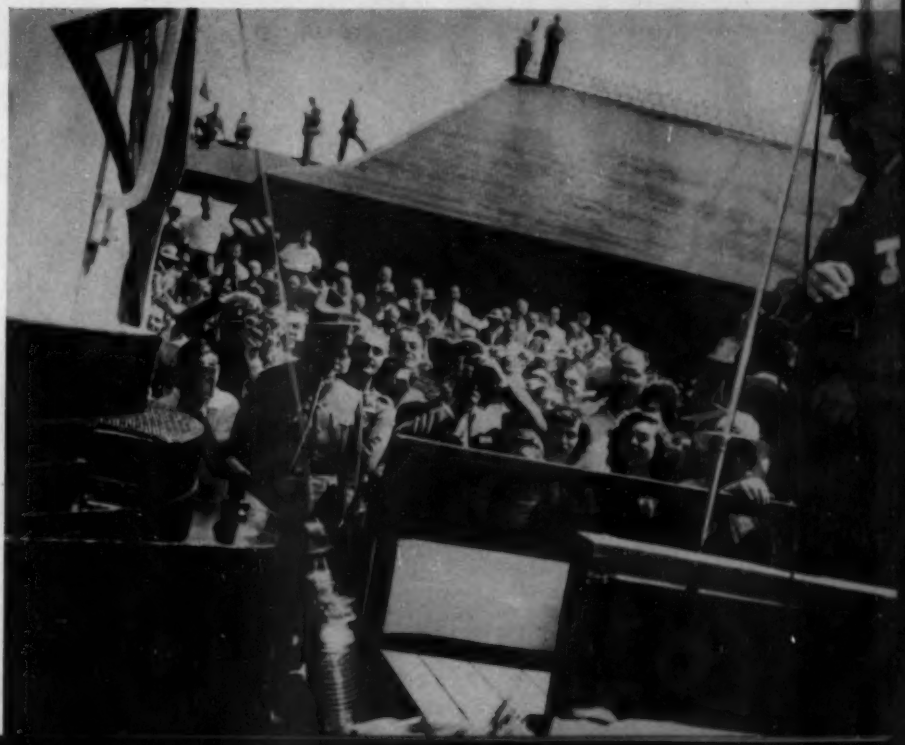
Three generations of the Morse Dynasty on hand for "Kingston Diesel Day." Left to right: R. H. Morse III; R. H. Morse, Jr.; and Col. R. H. Morse.

of any horsepower rating, as well as interchangeability of small replacement parts within those major assemblies.

Each 2400 hp. unit is powered by a Fairbanks-Morse 12 cylinder opposed-piston engine rated 2400 hp. for traction at 850 rpm. On the basis of brake horsepower for traction per cylinder, this engine rating is equivalent to the established ratings of other O-P engines used throughout the entire line of F-M diesel-electric locomotives as follows: 6 cyl. 1200 bhp. for traction; 8 cyl. 1600 bhp. for traction; 10 cyl. 2000 bhp. for traction. The 8 and 10 cylinder engines are used in a number of road-switcher models as well as in the "C"-line. The 6-cylinder engine is used in heavy switching locomotives.

The main generators and traction motors are of the latest Westinghouse Electric Corp. design using silicone and glass insulation and provide high continuous tractive effort—maximum speed combinations. The 4800 hp. passenger locomotive has a maximum permissible speed of 110 mph. yet can develop a continuous tractive effort of 60,000 lbs. at 25.6 mph. As an indication of the industrial setup required for the manufacture of this type of railway power, CLC officials point out that parts are provided by more than 160 separate concerns, most of them Canadian.

The Rt. Hon. C. D. Howe, Minister of Trade and Commerce and Minister of Defense Production, Ottawa, christens the new locomotive, the "City of Kingston."



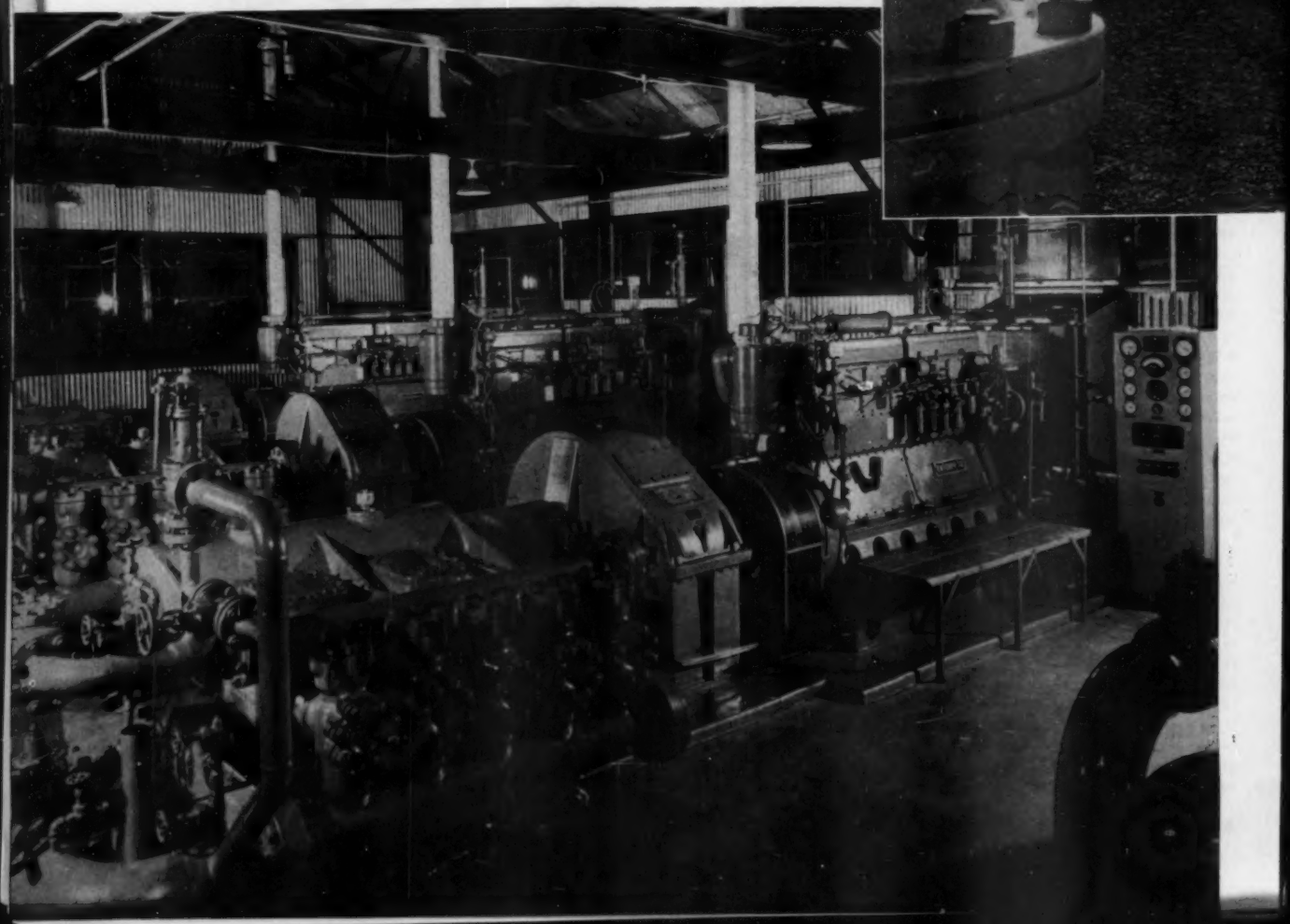
ANTELOPE GOES DIESEL

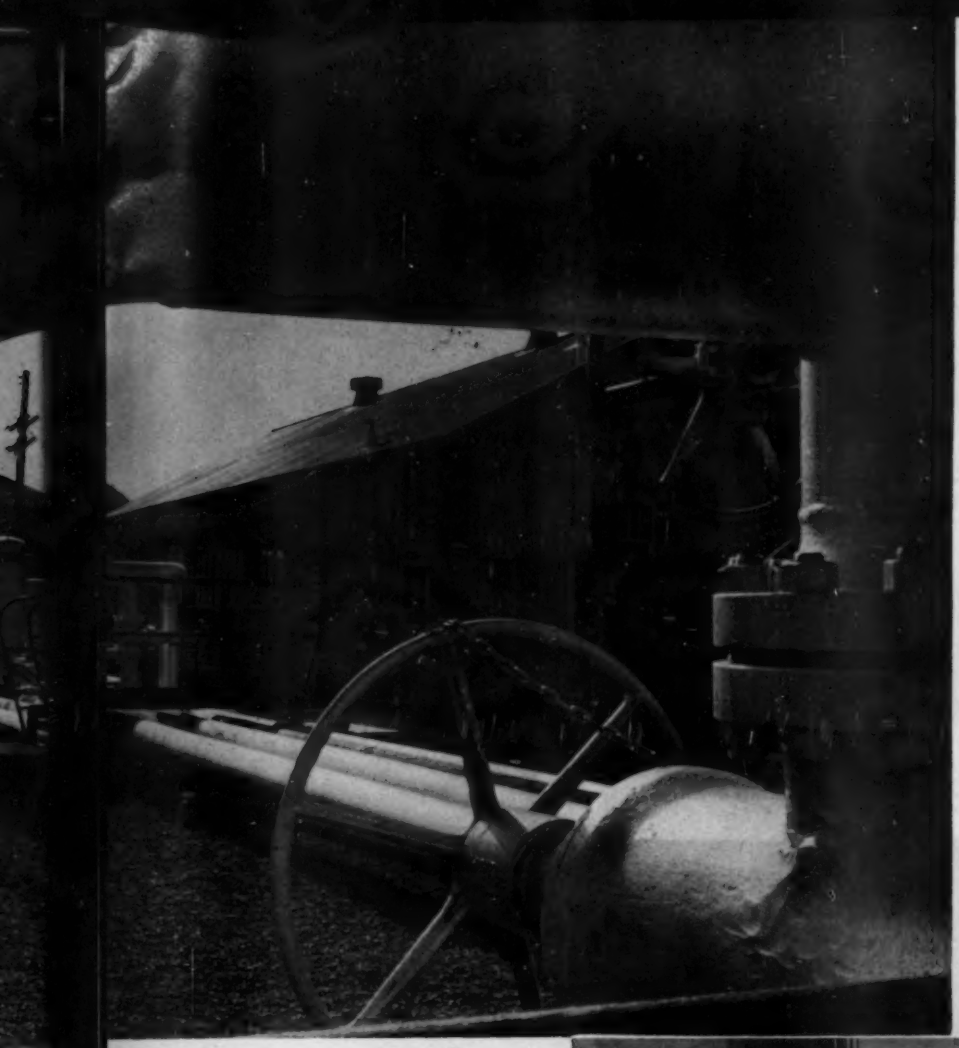
By **FRED M. BURT**

THERE was no interruption in Union Oil Company's Antelope Station pumping operation last March when three new Enterprise diesel engines quietly assumed the continuous task performed for the past 42 years there by its steam plant. Now this booster station is distinguishing itself, not only as reputedly being the most modern of the Pacific Coast's pumping plants, but can boast of setting new precedents for operating economy and self-sufficiency. During most of the year some 90% less fuel is consumed by the engines than was previously required to run the steam equipment.

Self-sufficiency is of prime importance, both economically and operationally to a remotely located pumping station of this type. Antelope, an integral part of Union's 8-inch main line from their oil fields near Bakersfield, pushes some 1,000 barrels per hour of 16 gravity crude 15 miles uphill toward its marine terminal at Avila, California, approximately 60 miles west. An optimum of self-sufficiency is achieved here by burning this same unrefined pipeline crude in the engines. This, of course, results in a double-edged slashing of overhead expenditures. Only a token supply of distillate diesel fuel needs to be trucked in. Their biggest advantage here, however, is that it is generally convenient all around to utilize some of the pipeline oil as fuel for their engines.

Of exceptional interest to the many pipeline and diesel engineers who have witnessed the efficient operation of Antelope Station are the engines which dutifully do their work, emitting a constantly clear exhaust, on a nearly exclusive diet of unrefined crude which has a viscosity of 800 to 1000 SSU at 122°F. Here in capsule is the answer: The three Enterprise engines are conventional





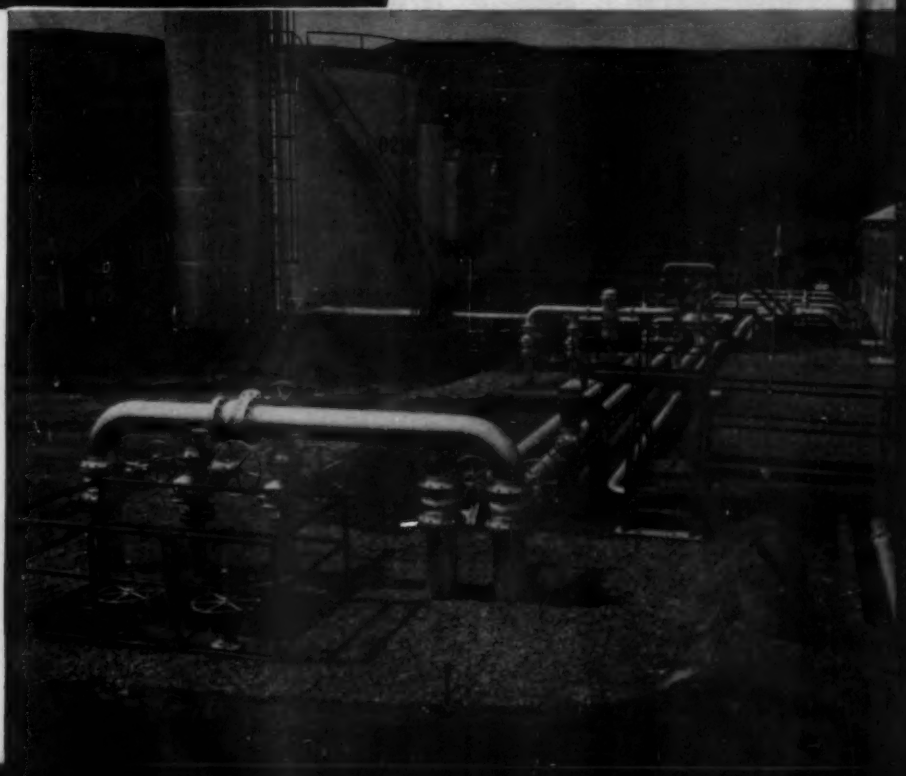
8-inch bore by 10-inch stroke, medium speed (220 hp. @ 720 rpm.) DSM-6's, equipped with heaters, strainers, and filters which condition the fuel oil for uninterrupted flow through the injection system and into the combustion chamber. After the station's Sharples centrifuge has removed the largest particles of the sediment and water from the fuel, the oil passes through a Cooley 524-BF fuel heater (mounted on engine) where its temperature is raised to 180°F. to bring it to a free flowing viscosity. From there the fuel passes through two metal edge Purolator strainers on to the fuel pump which pushes it through a pair of Purolator filters which capture any remaining impurities. The fuel, then ready for combustion, flows to the fuel header, on into the Bendix injection pumps, and finally through Bosch injection nozzles to its energizing end. Although the injection pumps, nozzles, strainers and filters used on these engines are standard equipment on all Enterprise engines, these, with the addition of the aforementioned accouterments, comprise the equipment necessary for burning the type of crude used at Antelope.

The only distillate diesel fuel required for these engines is that used during the 15-minute warm-up period and again for the same interval before shutting down. This procedure of purging the entire fuel system of the heavy crude is to insure easy starting on the following run. A recent inspection by Enterprise and Union engineers, after the number one engine had run 2,500 hours, revealed that Antelope's engines operate as efficiently and cleanly as their distillate fuel-burning counterparts. The ability of Enterprise engines to successfully burn crude and residual oil of such severe specifications as that used at Antelope is the result of exhaustive testing and improving on their basic engine models by the Enterprise Research and Development staff. Union Oil Company's Research Department, working in conjunction with the Enterprise staff, speeded this development by contributing its specialized

Antelope pipeline station looking through part of the manifolding towards the main pump house.

General view of the Union Oil Antelope pumping station with three Enterprise, 8 x 10, 220 hp. diesels driving Wilson-Snyder pipeline pumps through Western reducing gears and Airflex clutches. Diesels are started with Gardner-Denver 5-cylinder air motors. Young radiators in background.

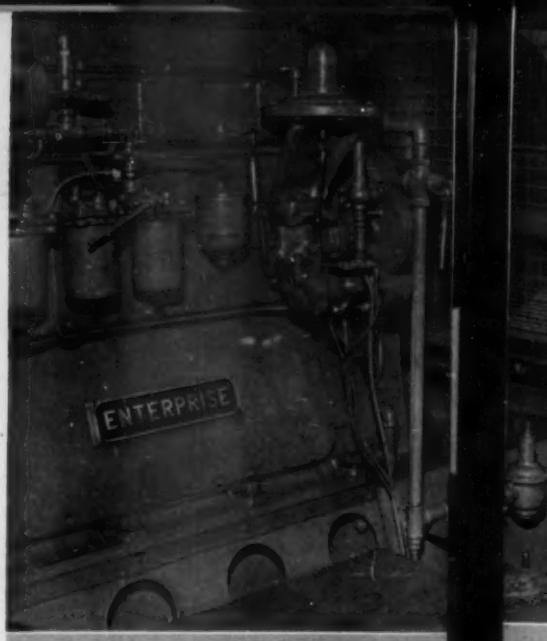
General view of the manifolding at Antelope. In the background oil lines carrying oil from pump discharge on to next station. Strainer in middle foreground and tank manifold to left.

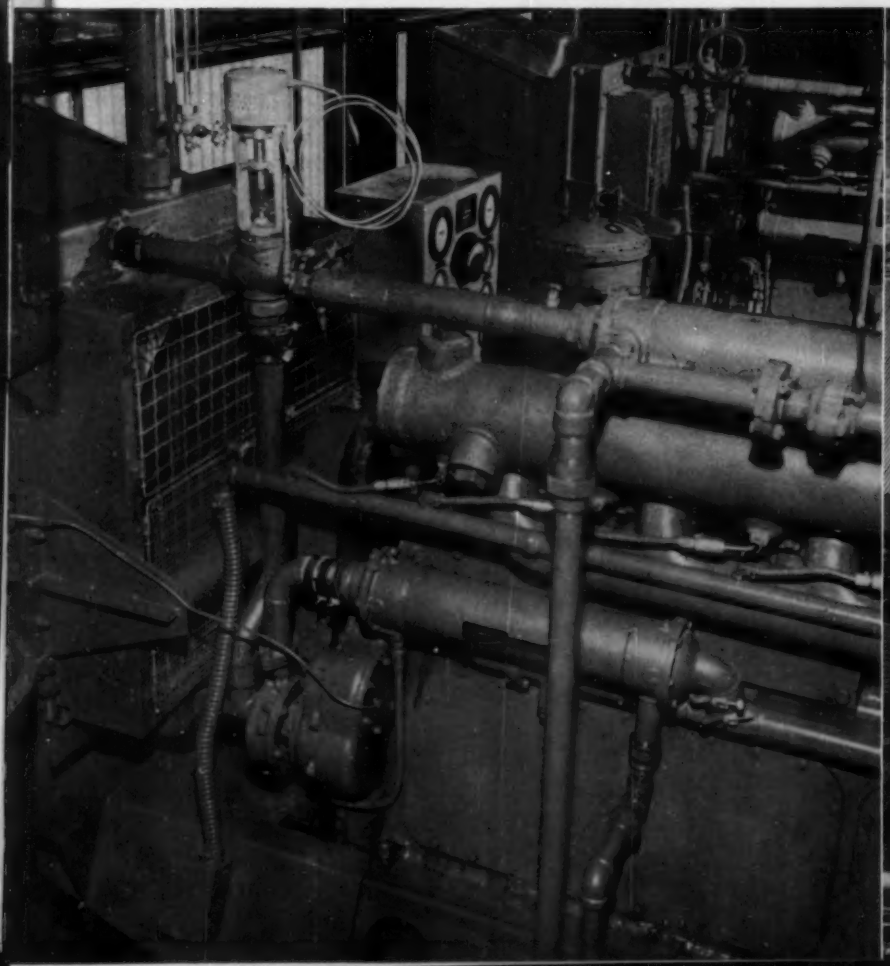


knowledge of fuel and lube oil abilities and properties. Engine tests were conducted using Union's newest, heavy duty, detergent diesel lube oil—Guardol.

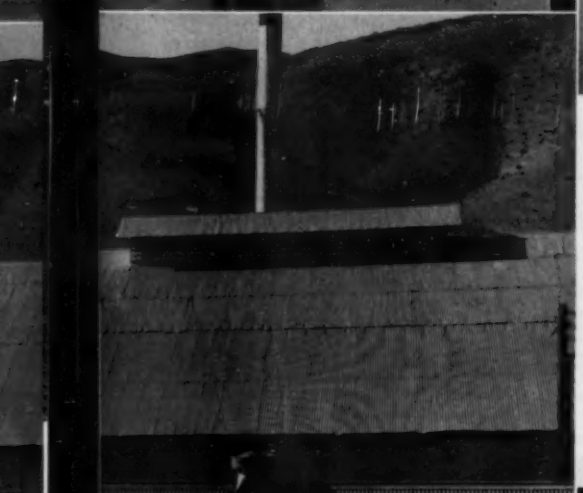
As a result of the successful operation of its Antelope booster station, designed by Elkhart & Arthur, Inc., Los Angeles, Union Oil Company is modernizing its Junction pumping plant near Blackwell's Corners. This plant is planned to be exclusively dieselized by summer of next year. Here again, outdated equipment is being replaced by six Enterprise DSM-6's which will also operate on crude fuel tapped from the pipeline. Engine equipment, clutches, gears, and pumps will be identical, but twofold to that at Antelope. Each engine will drive a Wilson-Snyder positive displacement Quintuplex pump through a Pacific Western reduction gear. Although these Wilson-Snyder pumps ordinarily maintain an outgoing pipeline pressure of 800 psi. with an engine bmep. of 80, there are extensive periods, sometimes stretching into weeks, when the pumps are required to maintain a partial load of just 400 to 500 pounds per square inch. During such partial load periods these engines continue to operate, ceaselessly, efficiently, at only 40 to 50 pounds brake mean effective pressure. The engines are equipped wtih a Cooley 524-BF lube oil cooler mounted on engines, which also act as a lube oil heater at certain times in order to maintain the Union Oil Company's "Guardol" diesel lubricating oil at a constant temperature of 170°.

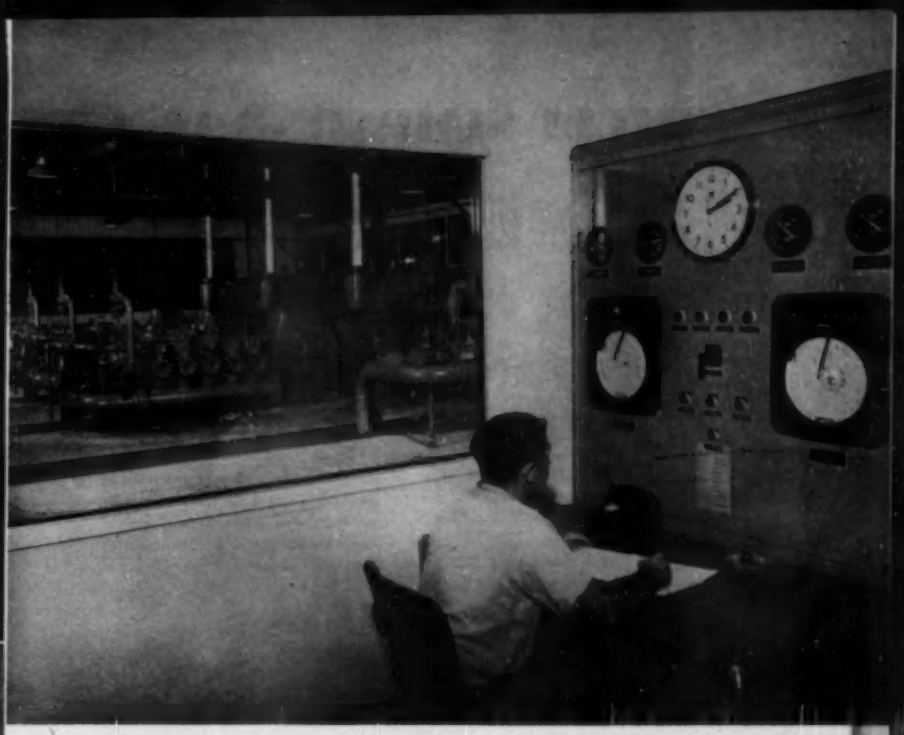
All of the engines are equipped with Honan-Crane full flow lube oil filters, Maxim exhaust spark arrestor silencers, Young radiators mounted on the extended engine subbases, Woodward SGX hydraulic governors with solenoid trip shut-off, Synchrostart overspeed trip governors, Air Maze oil bath air cleaners, Viking temperature and pressure control contactors, Automatic Switch Co. solenoid, explosion proof, for Woodward governor shutdown, and Foxboro air control motors for governor. The station is equipped with a Quincy Dual Drive air compressor, electric or gasoline engine driven to supply air for the Gardner-Denver air cranking motors, the Fawick Air-flex clutches, and the Foxboro pneumatic controllers. Columbia Electric Manufacturing Co. of San Francisco supplied a gauge board for each unit 78 inches high by 20 inches wide by 12 inches deep, complete with pressure and temperature gauges, Weston tachometer, Alnor exhaust pyrometer, Airflex clutch control valve, automatic shutdown and an alarm system with indicating lights. In addition, Antelope station is equipped with a Foxboro manual and auto control station for regulating the speed of the engines in relation to the line pressure of the crude oil.





This view shows two of the Young radiators at Antelope with Fulton Sylphon regulators controlling cooling water inlet. Top of Honan-Crane lube oil filter in center, one for each engine. Cooley-Thermxchanger oil cooler in foreground.



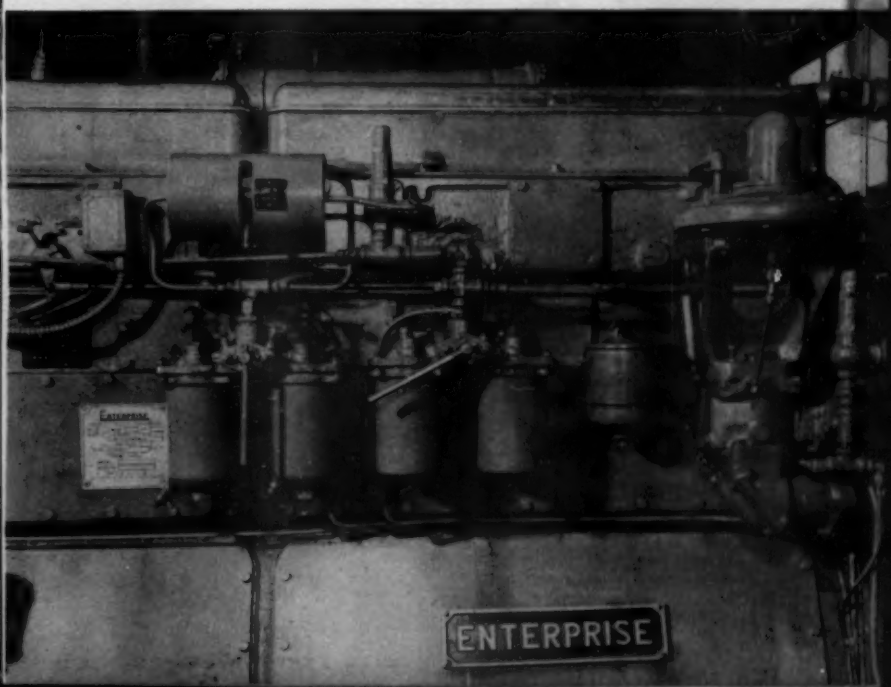


Unique shot of the control station at Antelope with three Enterprise diesels in the background. This was formerly a steam plant, now completely dieselized and modernized.

Top left: Enterprise 6-cylinder diesels showing control board with Weston tachometer, Alnor pyrometer, Woodward Governor controls and Viking automatic shut-down and alarm system. On engine note two of the four Purolator filters used on each engine.

Looking down on the diesel driven pump house of the Antelope Union Oil station now completely dieselized.

Close-up of the fuel control on Enterprise Antelope diesels showing the switch from light to heavy oil with four Purolator filters and the Woodward Governor control.



"CHILLI SIMPSON" IS A BUSY TOWBOAT

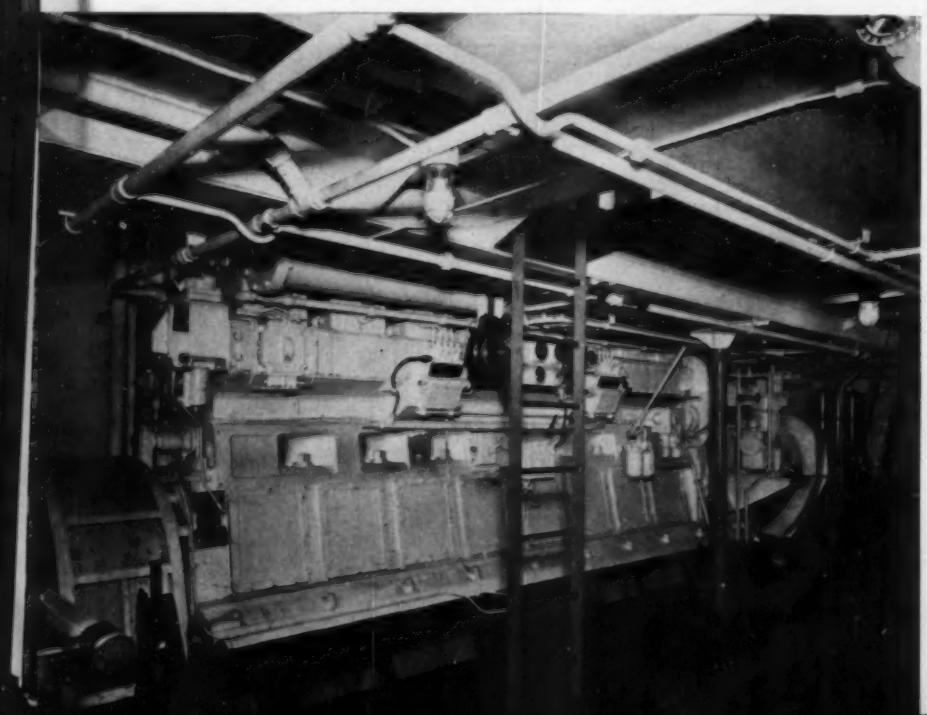
Launching Her Career Shoving 60,000 Barrels of Gasoline Up The Mississippi This Diesel Vessel Has Continued Earning Popular Esteem

By DAVID I. DAY

EARLY in December 1947, we witnessed a brand-new towboat fighting her way up the stiff currents of the lower Mississippi River. She was the *Chilli Simpson*, of the Simpson Oil Co., Inc., Charleston, Mo., and this was her initial work trip. Her first payload of 60,000 barrels of gasoline was in six barges and was being shoved up from the Standard Oil Refinery at Baton Rouge to the Simpson Oil terminal at historic old New Madrid, Mo. It was not merely a heavy load under the circumstances for a brand-new boat, but we noted she was making fine time as she passed the noted old river port of Natchez. Later figures revealed the boat had made her southern trip and return in 6 days, 19 hours actual running time. This achievement was properly noted in many river newspapers particularly those in Missouri. For the *Chilli Simpson* was Missouri-built at the yards of the St. Louis Shipbuilding & Steel Company. She was owned and operated by a well-known Missouri oil towing firm, the concern headed then as now by H. G. Simpson. And the first tow brought up by the fine 2000 hp. diesel vessel was unloaded at a Missouri terminal.

Naturally, this first trip and others which followed in rapid succession were not only pleasing to the owner and to the St. Louis Shipyards but brought satisfaction to the men in charge of the Cooper-Besemer Corporation, Mount Vernon, Ohio, who had provided the twin engines propelling the craft and her barges. Comments in the trade press at the time always included statements by the executives of the company building the main engines. In less than 6 months, the reputation of the *Chilli Simpson* extended along the Father of Waters all the way from New Orleans to St. Paul. While the finishing touches were being placed on the *Chilli Simpson* at St. Louis, we understood that Capt. C. G. Brumley would take the boat south on her maiden work journey, with Capt. Wayne Carpenter in the pilot house and with Paul Crumrine as chief engineer. At Baton Rouge, however, we were told that actually in command was Capt. Roy W. Holland.

One man at the Louisiana capital speaking of the smoothness of operation especially in the engine room said that Capt. Holland was much elated over the way the boat swung into action on the way down. And when he returned to New Madrid, he told the owners, "You have a real towboat, one of the very best." Along in mid-1951 as the boat locked through one of the upper Mississippi dams, we are informed the lockmaster made the same comment in substance. No other boat of her inches, doing such fine work at all seasons, has had less publicity. The men in charge of her have been too busy pushing oil and gasoline to give out news stories. The *Chilli Simpson* was one of the larger towboats to be delivered to a private owner on the Mississippi River after all the wartime restrictions were removed. The St. Louis shipbuilders had for some time specialized in the so-called "streamlined" towboats like the *Sohioan* and many others. But with the *Chilli*, they shifted to what many call the "functional design." Observe the photograph of the boat closely and you will see the sides are flatly vertical, the corners are neatly rounded and the whole superstructure presents a well-balanced appearance. The boat looks just like she is—a craft built for efficient and economical towing service. We had never seen a boat on the river with quite this same design but later we have noticed that the St. Louis builders headed by Chief Engineer Art Parsons enjoy giving each new towboat a distinctive appearance with an individuality of its own. To many, the *Chilli Simpson* looks longer than she is. The measuring string says the boat is only 112-ft. in length, 28-ft. in beam, and 9-ft. in depth, with a loaded draft of 6½-ft. She has a scow bow and a type of stern noted on a long list of the finest boats on the inland waterways. (Notice the *Celeste*, *Henry S. Sturgis*, the *Glenn Traer*, the *Twin Cities* and others to see the stern similarity mentioned.) With an all-welded steel hull, the *Chilli* has a deckhouse of steel, lined with plywood and insulated with "fiberglass." Quarters are provided for 10 on the main deck. On the main deck also are bathrooms for the crew and the cooks. On the upper deck are to be found the quarters for two pilots, two engineers, and the captain, with a connecting bathroom. One large room is used for galley and messroom.



We hear it stated often in discussions of river boating that as between various vessels "the engine room is the difference." It is certainly a delight to inspect the engine room of the *Chilli Simpson* especially when she is upstream bound pushing her normal oil tow. Her two Cooper-Bessemers are turbo-charged, 8-cylinder, 13 x 16 diesel engines. Each develops 1140 hp. at 450 rpm. or 925 hp. at 375 rpm. Ordinarily, river men figure the boat at 2000 hp. The selection of Cooper-Bessemers was not the result of high-pressure salesmanship. It was not brought about by impulsive choice. The selec-

tion of these engines came from experience with them on two earlier Simpson towboats. The only difference is that the engines on the *Chilli* are turbo-charged to increase their power. Both engines are equipped with Maxim exhaust silencers and Cooper air intake filters. The engines are located aft as on so many later St. Louis Ship towboats. This serves a double purpose. The shaft is shortened materially. And it localizes engine noise which naturally makes for more comfortable living in the crew quarters.

The boat has the skin cooling type of circulating water cooling for the main engines, the lubricating oil coolers are Ross shell and tube type with both the lubricating oil pump and the raw water pump for lube oil cooling built in on the main engines. The experience on towboats has been of late years that the temperatures can be better controlled to the benefit of engine efficiency if the cooling systems for circulating water and the lubricating oil are kept entirely separate. All the fuel oil used in the Cooper-Bessemer main engines is filtered with a set of six Luber-Finer filters. The starting air for the *Chilli Simpson* comes from two Gardner-Denver compressors. They are mounted on and driven by the main engines. In addition, for emergency or stand-by use a Fairbanks-Morse compressor was supplied. This F-M compressor was equipped with a V-belt, connected with a Caterpillar diesel engine. This same engine drives the 20 hp. Fairbanks-Morse fire and bilge pump. This pump has a capacity of 150 gpm. at 110 lbs. pressure. The airtanks were made by the shipyard force. The fuel bunkers on this boat hold 33,000 gals. If the supply is low, a fuel transfer pumps is at hand to bring fuel oil directly from the barges enroute. The boat is heated with a modern hot water system, using an electric circulator and Sunray radiators.

The steering system is similar to that observed on numerous boats built at St. Louis Shipbuilding. It is of the electro-hydraulic type with mechanical follow-up. There are two steering rudders and four backing rudders, the two kinds being controlled by separate rams and levers. The propellers are 84-inch in diameter with 3 wide blades. The propeller shaft bearings are from The Medart Company. In use also are stern strut Goodrich Cutless Rubber bearings. A Bowden filter is provided for handling wash water from the river if required. The drinking water is in a tank separate from the boat's hull and from it the pipes run to a water cooler in the main deckhouse, to the engine room, and to the galley. Many who have been employed on the *Chilli* the last few years praise her excellent electric power plant. This is basically made up of two Fairbanks-Morse generators, connected by a V-belt with a stub shaft on the main engines. However, there are two other generators, a 15 kw. and a 7½ kw. in addition to the two 10 kw. 125 volt direct current generators previously mentioned. The two generators additional are driven by a Caterpillar 30 hp. diesel engine. There is a 56 cell, 112 volt Philco battery "floating on the line" and all the electric circuits are under control from a switchboard made by the Wm. Wurdack Manufacturing Co. The voltage regulators on the tailshaft generators are what is called usually the "safety car heating type."

As on most boats on the inland waterways, the searchlights on the *Chilli Simpson* are from Carlisle-Finch. One is a 19-in. and the other a 12-in. arc light. In addition there are two 500 watt floodlights to illuminate the decks. The whistle is a Kahlenberg airborn. The galley has a shipmate range. The capstan on the forward deck is a 5 hp. unit from Schoellhorn-Albrecht. As fuel oil is used by the engines, ballast water is pumped into the ballast tanks so the boat is automatically kept level regardless of whether the old bunkers are filled or empty. The radio aboard is a Western Electric 100 watt ringing set from Warner-Tamble. The public address system came from Walter Ashe and Co., providing communication between the pilot house and the deck crew. The mate has a portable electric megaphone with which to give orders to the men. This is from Taybern Electric Co., N. Y.

Trico Electric Co-operative

By CLYDE F. LEWIS*

ELECTRIC power was introduced recently and has been growing rapidly in rural use in three counties in southern Arizona since 1947, when a group of farmers, ranchers, and cross-roads businessmen cooperated in an application for the necessary funds. It required many months to prove to the Rural Electrification Administration that the project was feasible but eventually an REA loan was arranged for the construction of a diesel power plant of 5000 kw capacity and the transmission and distribution lines.

The immediate needs of the cotton planters for the 1948-49 cotton crop were met by a small, temporary power plant. This consisted of six used gas engine generating units and two diesel units which also furnished power in their immediate vicinity and for the construction of the main station. The new 5000-kw. station with five 1440-hp. Superior diesels driving 1000 kw. generators was commenced in late October, 1949, 25 miles northwest of Tucson and 4½ miles west of Marana in the fertile Marana Valley. It was completed in March, 1950. The Construction Superintendent was C. F. Lewis, now owner of the Central Station Equipment Co., Tucson, who represents the Engine Division of The National Supply Company in the Southwest.

The operating company is Trico Electric Cooperative, indicating its three-county scope of operation in counties Pinal, Santa Cruz and Pima. Its offices are in Tucson with M. H. Voss as General Manager, and J. V. Swaim as Engineer. Roy T. Brockus is Plant Operator. Since the counties have an area of nearly 16,000 sq. mi., the transmission and distribution system for reaching all of the ranching and farming area is extensive. The area extends from the Mexican border to within a few miles of Phoenix. Some of the largest ranches in America are located between Tucson and the border. The area includes the Catalina mountains north of Tucson with the beautiful Mount Lemmon, a summer resort with 500 summer and winter homes, and a Federal Prison Camp which requires some 200 kw. capacity. The huge Papago Indian Reservation is also being served in the vicinity of Sells.

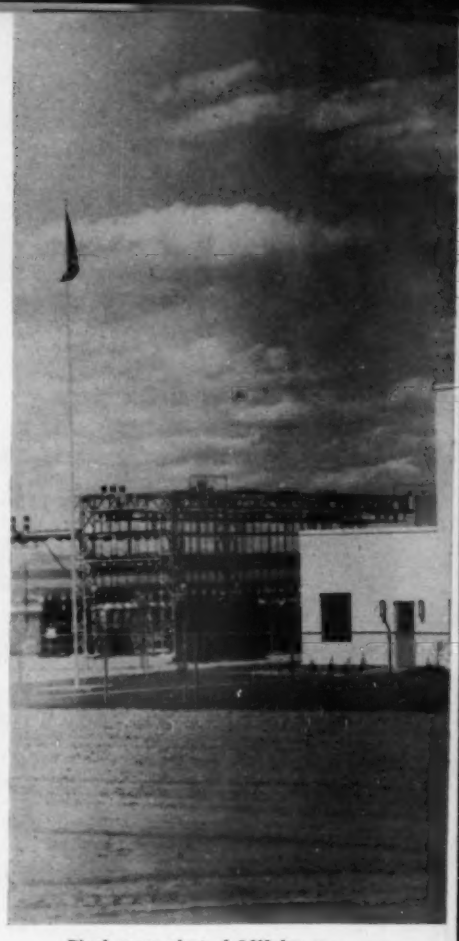
The new power station consists of five 1440-hp. dual-fuel Superior diesel engines running on natural gas and driving five 1250-kva., 2400-volt Ideal generators. Since inlet air has an extremely high temperature and low humidity in summer, a unique method of cooling the air is provided. The standard pad type evaporative cooler is used. Pads of approximately 6 x 9 feet and 6 inches thick are kept wet by a continuous flow of water from small pumps. Air is delivered at about 85 deg. to the engines when it is 108 deg. outside.

The station is designed as a unit type. Each generating unit is independent of all others with respect to cooling and its step-up transformer and synchronizing breaker are on the 12,500-kv. bus in the substation. Engine vibrations are insulated from the building with cork and all of the main piping is insulated by flexible sections which eliminate the possibility of vibration breaking pipe connections. There are individual control panels for each engine at the forward end near the governor.

Accessory equipment includes before and after lubricating oil pump, jacket water circulating pump, fan cooled radiators for oil and water, fuel pumps for both day tank and circulation, and a pump that delivers water for the evaporative coolers at the air inlet chambers. The air cleaners are Vortox and are of the full oil bath type. They were designed especially for outside mounting. Each cleaner is 50-inches in diameter and has a rated capacity of 8000 cu. ft. of air per minute. All gages and the gas flow meters are mounted on the control panel, enabling the operator to check each engine individually. Each panel also has automatic shutdown equipment which operates if lubricating oil filters at the engine or the turbocharger fail, or the engine should overspeed.

A year's operation has shown a very low cost per kilowatt hour. The average load at the end of a year was 3400 kw. and line extensions were expected to raise this average to between 4000 and 4500 kw. by August, 1951. Low operating cost is partially attributed to the low cost of fuel but also to the efficiency of diesel operation on gas or oil. The fuel control system on these engines is unique and controls are kept to a minimum. Control panels have only two push buttons, one for oil and one for gas, and corresponding signal lights. Fuel is selected by merely pushing the "oil" or "gas" button. Since dry gases will not ignite at the engine compression of 400 psi, a small pilot charge of fuel oil is injected to ignite the gas.

An automatic pilot oil control is operated by the governor so that any shortage in the gas supply will be compensated by injection of more fuel oil. If the engine load then decreases, or if the gas supply increases beyond load requirements, oil fuel injection is reduced automatically to pilot ignition volume. If it is desired to operate the engine on less than full load gas requirements, the hand operated valve in the gas supply line may be set on its graduated dial to restrict the flow of gas to the desired amount. The governor then increases oil fuel injection automatically to the required amount. The engine may be stopped simply by moving the control lever to "stop" position. Gas fuel for the engines is supplied by El Paso Natural Gas Company from collection fields at Jal in southeastern New Mexico. An 8-mile line is connected into the company's main line near its Tucson Compressor Station. Pressure is stepped down from 600 lb. to 150 lb. to 40 lb and finally to 15 lb. and is carried to the engines through 3-inch lines from a 16-inch manifold running the length of the building. The gas is rated at 1070 Btu. per cu. ft. and has been supplied at approximately 19 cents per million Btu.



Diesel power plant of 5,000 kw. capacity west of Marana, Arizona, operated by Trico Electric Cooperative, serves rural consumers in an area of nearly 16,000 sq. miles in three counties south of Tucson. Five Fluor exhaust silencers at right.

In anticipation of increased power requirements, additional space was provided for a sixth diesel engine with as much as 2500 kw. output and for switchgear control panels. All underground conduits and piping have been installed for the future unit, except for the cooling. Openings were provided in the building foundation for the cooling piping. The electrical system in the building is arranged for future power requirements without further additions. The generator control switchgear is provided with automatic synchronizing and automatic voltage regulation. The 2400-volt generator leads run underground directly to the unit type substation in the switchyard, thus providing for safe operation, since the highest voltage in the station proper is 230 volts.

The building is constructed of steel framing to which pre-cast concrete panels are attached. Space is provided for plant office and a well equipped shop. A basement in front of the engines provides space for all auxiliary equipment. The building is cooled by evaporative-type coolers maintaining comfortable working conditions during the summer months. A traveling crane with electric hoist facilitates engine maintenance.

**General Manager, Central Station Equipment Company, Tucson, Arizona.*

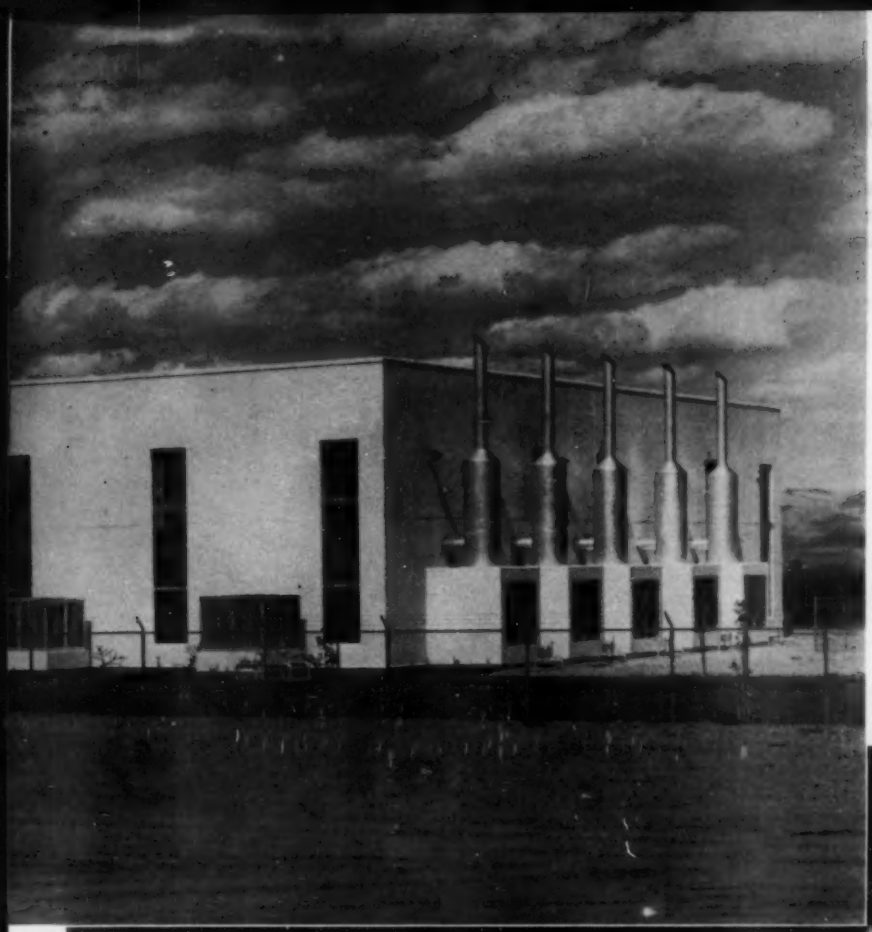


Table of Equipment

Engines—Superior, The National Supply Co. Engine Division.

Generators and Switchgear—The Ideal Electric & Mfg. Co.

Cooling Equipment and Silencers—The Fluor Corporation, Ltd.

Step-up Substation—Pacific Electric Mfg. Corporation.

Fuel Oil Filters—The Hilliard Corporation.

Lubricating Oil Filters—Honan-Crane Corporation.

Air Intake Filters—Vortex Company.

Gas Filters—Dollinger Corporation.

Gas Meters—Pittsburgh Equitable Meter Co.

Fuel Oil Meters—Bowser, Inc.

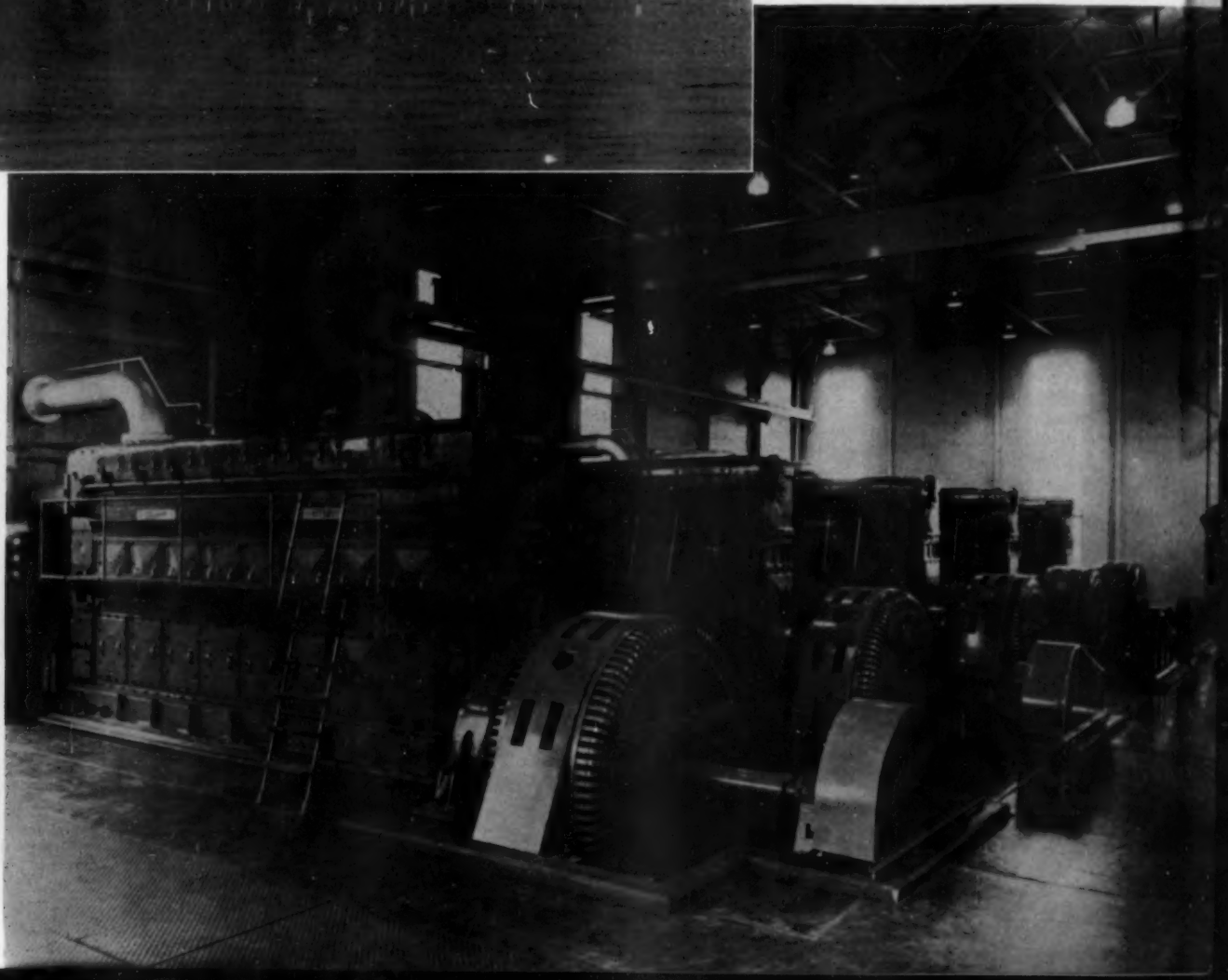
Overhead Crane—Whiting Corporation.

Water Circulating Pumps—Ingersoll-Rand Company.

Lubricating Oil Pumps—Blackmer Pump Company.

Temperature Control Valves—Fulton Sylphon Co.

Five 1440 hp. dual-fuel Superior diesel engines driving Ideal generators near Marana, Arizona, give rural consumers in three southern Arizona counties a 5000 kw. power plant.



BIG PLOW GOES 2-WAY!

Post Brothers Now Build Their Famous Super Furrow-Turner in a Right and Left Combination to Eliminate Canyon-Size "Dead Furrows"

By F. HAL HIGGINS

THE most featured farm tool in the world has a "new look" in its 1951 model. That means, all the feature writers, editors and cameramen who have given it space and time over the past 20-odd years can start all over without having to repeat what they have been running about it over and over for two decades. The "Big Plows" of Post Brothers at a country shop west of Santa Ana, Calif., have been feature picture news for all these years. True, there have been some changes over the years. These changes came mostly since the arrival of the diesel tractor, which permitted the building of bigger and bigger plows to turn over deeper furrows. Now they are down to 6 feet for the biggest sizes with 2-, 3- and 4-foot depths on the smaller ones. For the big fellow, it has been usual to hitch on four or five of the biggest diesel crawler tractors—D8's or HD19's—depending on soil and terrain being worked over.

It has puzzled the writer over the years as to just what there is about the Big Plows that so fascinates editors in all classes and ranks from country weeklies to the "Saturday Evening Post." Over the years, the Big Plows, from the earliest one of Plavin to the latest of Post Brothers, have gotten the call from editors who know nothing of farming or the economics of such a plow. For 25 years, pictures of the big plows being developed on the Santa River bottoms to save valuable sand-covered farming lands have been coming to the writer's attention. So, in a recent trip to Southern California, he made a special trip out to Post Brothers' shop, 3 miles west of Santa Ana, and interviewed the builders and learned what the present status is on this over-publicized earth turner.

"We started way back in the 1920's filling pipe line ditches by mule and dump scraper power," said

This big boy hasn't been given the "hot-foot." It is the new 2-way Post big plow that can plow a field without leaving either "back furrow" or "dead furrow." The 2-way outfit is pulled across the field with one bottom down turning soil. At the end of the field, the tractors pulling it turn square around and come back with the opposite plow bottom working and the one that did the plowing coming down the field is lifted out of the ground and carried to the opposite end when they again change positions.

Fleet of four diesel Cats drawing Post Brothers heavy duty 6-ft. plow used to turn down and mix with soil below, sand that has been deposited by flood or wind. Santa Ana, California. (Courtesy U. S. Soil Conservation Service.)

Mr. Post. "Then we got a tractor and Killefer built a bulldozer that we could set at an angle and shove the dirt into the ditch as the tractor moves along parallel with the ditch being filled. That was about the first bulldozer work; certainly it was the first on ditch filling. A farmer named Plavin, over in the Santa Ana bottom area, built himself a big plow to restore to use a piece of his ground that had been covered with a coat of sand from floods during the winter rains. Plavin's plow worked, but he didn't build any more. Hence, his neighbors came to us for help in solving their problem after we had built a plow to lay a telephone cable to a depth of 6 feet and covered the cable at one pass. So, we got into the custom plowing business with that big cable-laying plow idea. When the first diesel tractors came along, the Caterpillar dealer came out and made his pitch that his RD8 would do the work of two of the old gas 60's. We asked for proof, and when the diesel did what he said, we ordered one and sold our gasoline crawlers. It was a tough pull for us at that time to make the payments and finally own that first diesel clear. Now, we use nothing else, and the big 6-foot plows usually take five of the big diesels.

"We ship the big plows all over the world now and have standardized in four sizes: 2-, 3-, 4- and 6-foot sizes. One big crawler will usually handle the smaller plow. In case of heavy soils, it may call for two tractors. The other sizes also call for the power in 2-, 3-, 4- and 5-unit teams, depending on type of soil encountered. But the big new thing that no one has seen outside of our shop and neighborhood is our 2-way plow that can work back and forth from one end of the field to the opposite to complete the field without leaving a mountainous 'back furrow' or a canyon for a 'dead furrow.' Looks like the plow has wings as you see it going away from you with one share lifted free of the ground while the opposite share is down in the ground turning a tremendous furrow. While we still do a lot of custom work with our big plows around here at rates as high as $40 or $50 an acre, we sell our big plows all over the world. Some 200 have gone to all areas in the U. S., as well as into foreign lands. One thing some people have to learn is that not all land is worth the cost of such plowing. You have to have the good soil down deep worth bringing to the surface to make it pay, of course."

All of the Post Brothers' plows are similarly designed to incorporate only the most modern and recognized construction practices. The advanced design is the result of years of experience in the construction and successful operation of deep tillage equipment. The frames are of all welded, boxed, channel construction, and are engineered to withstand the most exacting requirements for long years of deep plowing service. The lift mechanism is operated by a single hydraulic ram or cable. The lever arrangement permits a quick and positive lift. The moldboard is fabricated from a single piece of steel. Secured by readily accessible bolts, it is easily removed should occasion demand. The hinged hitch permits complete three-way adjustment. Such an arrangement permits the plow to closely follow land contours. All Post Brothers Plows are provided with the flexible hitch which permits LEVEL plowing at any depth. These plows are all built on order.

BENTON, ARKANSAS

New Fairbanks-Morse 2,000-Hp. Engine and Two F-M Converted Units Take Over Entire Load at Savings of $33,000

IN just three months, the Benton municipal power plant switched completely from oil-burning diesels to dual-fuel engines which consume cheap natural gas with a small quantity of pilot oil. In April, 1950, this progressive Arkansas city put into service a new 2,000-hp. Fairbanks-Morse dual-fuel engine. In May, it converted to dual-fuel operation a 1,400-hp. F-M diesel which had been in service since 1945. In June, it converted to dual-fuel operation an 810-hp. F-M diesel which had been installed originally back in 1940. The proven result of this triple attack on the high cost of fuel is an annual saving of more than $33,000.00. Benton still has diesels in its plant but they serve as standbys while the gas-burning units carry the entire load. The first of the six Fairbanks-Morse engines in the plant, installed in 1928, is a 360-hp. Model 32VA, crankcase-scavenging diesel. Next, in 1932, came a 210-hp. unit of the same type. In 1937, the city switched to an 810-hp. Model 33D16, pump-scavenging diesel which set the pattern for succeeding additions to the plant. A second 5-cylinder, 810-hp. unit came in 1940, and a 7-cylinder, 1,400-hp. engine of the same type five years later. These, of course, were the units converted to dual-fuel in 1950. The 2,000-hp. engine, largest and newest prime mover in the plant, is a 10-cylinder unit of 16-in. bore and 20-in. stroke, developing its rated horsepower at 300 rpm. Instead of the built-in air pump, this big two-cycle engine is served by a motor-driven blower.

In order to appraise the accomplishments of the dual-fuel engines, we have selected a 12-month period ending October 31, 1950, a period which includes five months in which the diesels bore the whole load, two months with both oil and gas engines in service, and five months in which the dual-fuel units carried virtually the entire load. During the year, the diesels produced 3,753,940 kwh. while consuming 318,728 gal. of fuel at a total cost of $28,185.78. This is an average fuel cost of 7.5 mills per kwh.

The dual-fuel engines generated 4,334,180 kwh. on a fuel consumption of 53,457,000 cu. ft. of gas costing $10,383.25 and 45,354 gal. of pilot fuel costing $4,213.51, a total fuel cost of $14,596.76. The cost per kwh. was 2.39 mills for gas and 0.97 mills for pilot oil, a total of 3.36 mills. Here's the way the savings per kwh. shape up: Diesels, 7.50 mills; Dual-fuel, 3.36 mills; Saving, 4.14 mills. For the seven months the gas-burning engines were in service, the saving on fuel amounted to $17,943.50. For a full year, with production volume equal to that of 1950, the saving of 4.14 mills per kwh. will total $33,484.82. Actually, savings will be somewhat higher because the price of fuel oil rose during 1950 and the dual-fuel advantage rises with the price of oil. Wyatt B. Crawford, superintendent of the electric light, water works and sewer districts, calculates annual savings of $36,000.00. He points out that this saving is sufficient to pay off in 20 years the interest and principal on revenue bonds which financed the purchase of the 2,000-hp. engine, conversion of the two diesels, construction of a $100,000.00 sewage disposal plant, and construction of a new $75,000.00 reservoir. In addition to all this, the city will net $13,000.00 a year.

In Benton's 6-engine, 5,590-hp. power plant, three units totaling 4,210 hp. are dual-fuel and three totaling 1,380 hp. are diesel. Of course the dual-fuel units are capable of operating as full, oil-burning diesels. In case of failure of the gas supply, these engines switch to oil instantaneously without dropping their load. The plant uses the same oil as pilot fuel as it used for its diesels. It is a 28-32 gravity diesel fuel delivered in tank car lots and stored in two 12,000-gal. steel tanks. From storage the oil goes by gravity through meters to individual day tanks (a 600-gal. tank for the 2,000-hp. engine). Supply pumps on the engines draw oil from the day tanks through duplex filters. On the dual-fuel engines, separate small-volume injection pumps handle the fuel when the engines are operating on gas and pilot oil. The natural gas, with a heating value of 1,000 Btu. per cu. ft., reaches the plant at 35 lb. pressure and passes through meters and regulators before reaching the throttle valves on the engines. Automatic safety devices prevent admission of gas unless pilot oil is being delivered to the cylinders to initiate combustion.

Supt. Crawford and Plant Engineer V. E. Carleton report that their gas engines run cleaner and are easier to lubricate than the diesels. An additive oil is used both in the cylinders, fed by force-feed mechanical lubricators, and in the crankcase with its pressure circulating system that lubricates the bearings and cools the pistons. Included in the circuit of each of the larger engines is a lube strainer and a shell-and-tube oil cooler. In the case of the 2,000-hp. unit, oil is drawn continuously from the sump by a motor-driven pump and put through a cellulose-type filter. Analysis of the oil after 2,000 hours of engine operation showed it to be in perfect condition. The converted units offer a good base for comparison between diesel and dual-fuel per-

Of the six Fairbanks-Morse units in the Benton plant three totaling 4210 hp. are dual-fuel and three totaling 1380 hp. are diesel. The major dual-fuel units are at left.

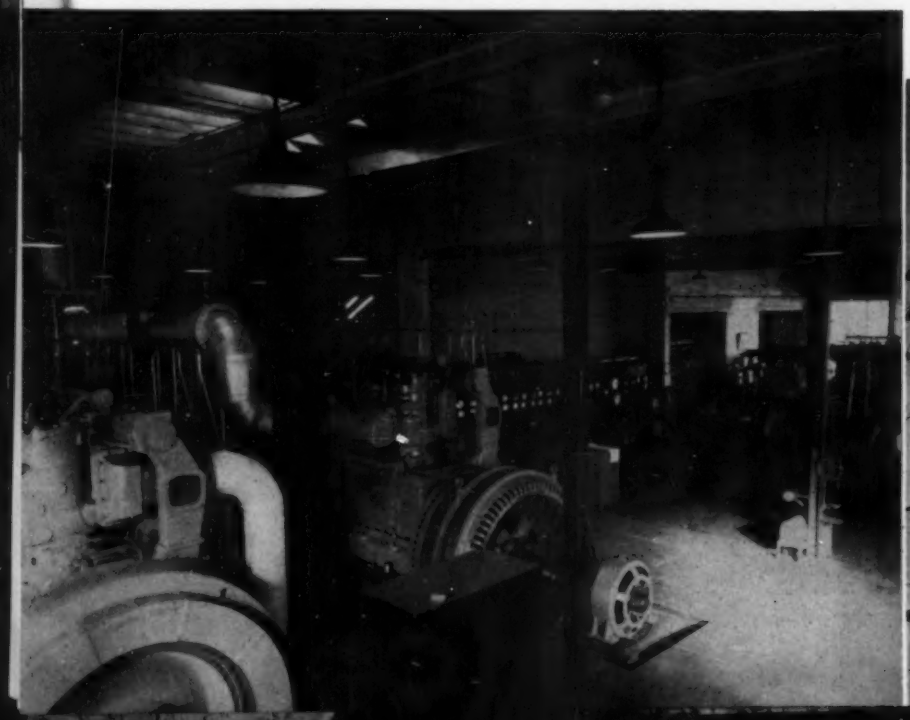


TABLE I

	Kw.Hr. Generated		Diesel Fuel		Gas		Pilot Fuel	
	Dual-Fuel	Diesel	Gal.	Cost	MCF	Cost	Gal.	Cost
1949								
Nov.		629,720	52,160	4,306.20				
Dec.		665,940	55,240	4,557.30				
1950								
Jan.		650,250	55,180	5,104.15				
Feb.		566,940	47,690	4,351.71				
Mar.		587,000	49,580	4,524.18				
Apr.	129,000	486,590	44,506	4,060.74	1,225	196.00	1,044	95.70
May	488,400	161,710	13,890	1,267.46	5,845	909.85	4,700	428.64
June	710,250	5,790	482	44.04	8,856	1,771.20	7,190	655.73
July	741,230				8,955	1,791.00	7,090	646.61
Aug.	801,630				9,646	1,929.20	9,410	870.43
Sept.	724,410				9,250	1,850.00	7,160	662.30
Oct.	739,280				9,680	1,936.00	8,760	854.10
Total	4,334,180	3,753,940	318,728	$28,185.78	53,457	$10,383.25	45,354	$4,213.51

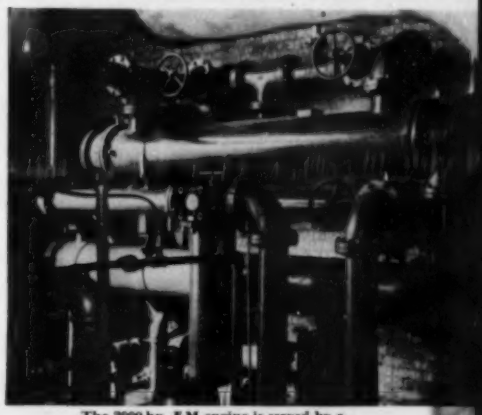
formance and it is interesting to note that filter elements now last three times as long as they did when the same engines ran on oil. The four largest engines all have motor-driven auxiliary lube pumps. The 1,400 and 2,000-hp. engines have closed cooling water systems and each has a motor-driven centrifugal pump to circulate soft water through the engine jackets and individual shell-and-tube heat exchangers. Similar pumps put raw water through the exchangers, the oil coolers and an induced-draft cooling tower. The older engines in the plant have an open cooling system but utilize the same tower.

Scavenging air for all engines is cleaned by impingement-type filters. In the case of the 2,000-hp. unit, the air passes through an intake silencer and then goes to the motor-driven blower. The blower's 125-hp. motor draws its power directly from the big engine's generator to insure that it will be in operation whenever the engine turns over. A motor-generator set is used to force the field of the big generator when the engine is started. This provides a quick surge of power to bring the blower up to speed. For safety and operating convenience, there is a compact gauge and alarm panel near each engine. Each panel holds a multi-point exhaust pyrometer and pressure gauges on lubricating oil, jacket water and raw water.

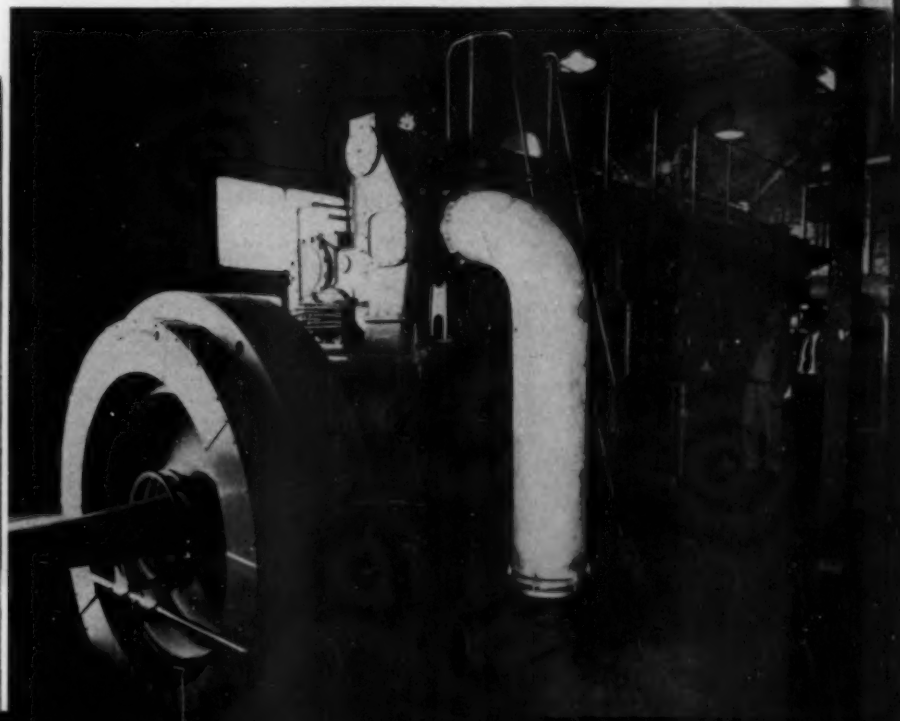
Benton has been growing at a phenomenal rate. Between the 1940 and 1950 census tabulations, population rose from 3,500 to 6,300 and much of this growth had been concentrated in the last few years. In 1947 the electric department had 1,776 customers and in 1950 there were 5,000. Consumption of electricity has been nicely balanced between industrial and residential consumers. Three furniture factories, four lumber mills and a pottery shop have collaborated with home appliances and air conditioning to raise morning peak loads to 2,100 kilowatts. But the plant has kept pace with demand. Mr. Crawford and Commissioners H. W. Finkbeiner, W. R. Kaufman and Fred Walton have seen to it that expansion of generating facilities came in time to anticipate load expansion. The city has an exchange agreement with Arkansas Power and Light and has sold some power to the utility but has never found it necessary to purchase any. In the last 20 years, there has been only one 12-minute interruption of service because of engine trouble. The plant has been consistently profitable (net earnings topped $50,000.00 in each of the past two years) and cash contributions to the city have been so great that currently the city is tax-free. With economical dual-fuel engines handling all of the expanding load, Benton looks confidently for even greater power profits in the years ahead.

Principal Equipment

Engine—One 2,000-hp., 10-clinder, 16 x 20 in., Model 33FD16 dual-fuel unit operating at 300 rpm. Fairbanks, Morse & Co.
Governor—Woodward Governor Co.
Fuel Filter—Wm. W. Nugent & Co.
Gas Meter—American Meter Co.
Gas Regulator—Fisher Governor Co.
Cylinder Lubricators—Madison-Kipp Corp.
Lube Strainer—Purolator Products.
Oil Cooler—Ross Heater & Mfg. Co.
Oil Purifier—Hilco Hyflow. The Hilliard Corp.
Cooling Tower—Water Cooling Equipment Co.
Heat Exchanger—Ross Heater & Mfg .Co.
Air Filter—American Air Filter Co.
Exhaust Silencer—Maxim Silencer Co.
Scavenging Air Blower—Roots-Connersville Blower Corp.
Pyrometer—Alnor. Illinois Testing Lab.



The 2000-hp. F-M engine is served by a Ross heat exchanger, a Ross oil cooler and a Purolator lube strainer.



Newest engine in the plant is this 10-cylinder, 2000-hp. Fairbanks-Morse dual-fuel installed in April 1950. Here Plant Engineer V. E. Carleton points out the setting on the Woodward governor to Superintendent Wyatt B. Crawford.

REPOWERED TUG "TITAN"

In Less Than Two Years With 1750 hp. Nordberg Diesel, Powerful Tug Travels More Than 33,000 Sea Miles — Has Never Had A Service Failure

By MUNGER T. BALL*

IN less than two years since the installation of a 1750 hp. Nordberg diesel engine, the tug *Titan*, owned and operated by the Sabine Towing Company Inc., of Port Arthur, Texas, has travelled 33,370 sea miles. During that period this powerful ocean-going vessel has been at work almost every day in the year and has never had a service failure. The *Titan* is further distinguished by being the most powerful tug in the United States equipped with a slow speed, heavy duty diesel engine directly connected to the propeller shaft.

Shortly after her shake-down cruise in 1949, the *Titan* was called upon to demonstrate her new-found power. A large 15,000 ton tanker, fully loaded, experienced engine trouble off Sabine, Texas. The *Titan* went out to bring the ship in, but the owners of the tanker wanted the ship in Philadelphia and so the *Titan* headed east with her in tow. The 1500 miles were made at an average speed of 7½ knots. In September of 1950, when the tail end of a hurricane hit the Louisiana coast, a large seagoing derrick barge, that was being used in off-shore drilling operations by one of the major companies, was being towed to a port of refuge. This derrick barge had a crew of some ten men on board and she went adrift. The Coast Guard did not have a vessel available for her rescue, none of the harbor tugs would venture out into the teeth of this hurricane, so the Sabine Towing Company was asked to send the *Titan* to make the rescue. The *Titan*, under the command of Captain H. G. McElwee, a veteran of many years of ocean towing service with this company, put out to sea and with the aid of radar and wireless telephone, after some 24 hours of search, the derrick barge was located and through skillful seamanship and maneuvering a hawser was put on board and, finally, the derrick barge brought to a safe port of refuge. This is only one of several salvage operations that the *Titan* has performed during the hurricane season since she has been put into commission.

The tug has been showing its muscles ever since. For many months last year it was active in moving Liberty and Victory-type cargo ships from the preparation area around Orange, Texas, and Houston to the storage area near New Orleans, La. Since the fall of 1950, the *Titan* has been towing a 40,000 barrel ocean barge back and forth between Houston, Texas, and Jacksonville, Florida.

The story of the tug *Titan* starts in 1912 at Port Richmond, Staten Island, New York, when the Staten Island Shipbuilding Company's hull #449 was laid down. This hull was destined for the Erie Railroad for New York Harbor Service, but the Panama Railroad purchased the boat and named her *Empire*. Originally a coal burning tug fitted with a triple-expansion steam engine, the Tug *Empire* was used in the construction of the Panama Canal. During this time the tug was caught in a rock slide and was severely damaged. After the canal was completed, the ship served her owners in that area until she was sold in 1923 to the Danziger Lumber Company, who in turn sold her to the Sabine Towing Company the same year. The tug *Empire* was immediately converted from coal to oil by her new owners and then started into coastwise and ocean towing in the Gulf of Mexico and up the Atlantic Seaboard.

The hurricane of September, 1928, found the tug and her oil barge tow in Pensacola, Florida. As the storm increased, the tug and the barge were forced to anchor in Santa Rosa Sound, and while attempting to find a sheltered spot, the tug struck some object and lost the blades from her propeller. The helpless tug finally ended up in the piney woods over a half mile from deep water. The *Empire* was rescued by dredging a channel, refloated and repaired. She continued her service until 1949 when the steam plant was replaced with a Nordberg diesel engine and this new power called for the new, more appropriate name, the *Titan*. The *Titan* is 110-ft. long, 25.5-ft. in breadth and has a gross tonnage of 296 and a net tonnage of 201 tons. The ship has a draft of 12-ft. 6-in. forward and 14-ft. aft. The hull and all decks are of steel construction, as is the superstructure, with the exception of the upper deck house. This house, consisting of the pilot house and master's cabin, are of wood construction. The ship is divided into five water-tight compartments: (1) fore peak fresh water tank, 35 tons, (2) after peak fresh water tank, 38 tons, (3) fuel tank cross bunkers amidship, 1250 bbls., and (4) foc'sle and store room, and (5) engine room.

The main propulsion unit, which provided the *Titan* with her new name, is a 1750 shp. (at 327 rpm) Nordberg diesel engine. This unit is an 8 cylinder, 16-in. x 22-in., 4-cycle marine direct-reversing supercharged diesel engine, type FSM-168-SC. Air is supplied to the engine by an Elliott supercharger equipped with an Air-Maze intake silencer. Exhaust gases are handled by an 18-in. manifold to a Maxim silencer and spark arrestor. The engine valve gear is totally enclosed and has forced-feed lubrication to all moving parts. The lubricating oil circulating pump circulates 150 gpm. part of which is used to cool the engine pistons. The capacity of the lubricating oil system is 450 gallons. The fresh water, salt water, and lubricating oil circulating pumps, as well as the fuel oil pressure pump, are engine driven. A Woodward overspeed governor is incorporated to protect the engine while the main engine gauge board enables the engineers to keep a close check on all phases of engine operation.

Part of the engine power at the shaft can be used to drive a 120 volt, 80 amp. General Electric generator. This unit automatically goes into operation when the fourteen 110 volt Exide marine batteries need charging. A 15 kw. Hercules diesel-electric generator, a 30 kw. Buda diesel-electric generator and a 100 kw. Superior-Delco generator provide further electrical power. Compressed air is provided by a Hercules diesel-Worthington air compressor and by an electric-driven 2-stage Gardner-Denver compressor. Starting air for the engine is stored in three 112 cu. ft. tanks at 250 psi.

When the *Titan* was converted to diesel, the double towing bits were moved 8-ft. farther forward, making the distance from the bits to the centerline of the rudder 25-ft. With the bits in this position, the tug can handle a very large and heavy tow with great facility, maintaining a greater degree of maneuverability. The *Titan* is capable of handling a 5,000 ton barge at 8.5 knots loaded with a 26-day cruising radius. Another factor giving the *Titan* the ability to handle difficult assignments is the heavily balanced, semi-floating rudder.

The hull repairs and the main engine foundation were made by Levingston Shipbuilding Company of Orange, Texas. Alterations, reconversion and machinery installations were performed by Sabine Towing Company's shops. Some aspects of this

*President, Sabine Towing Company.

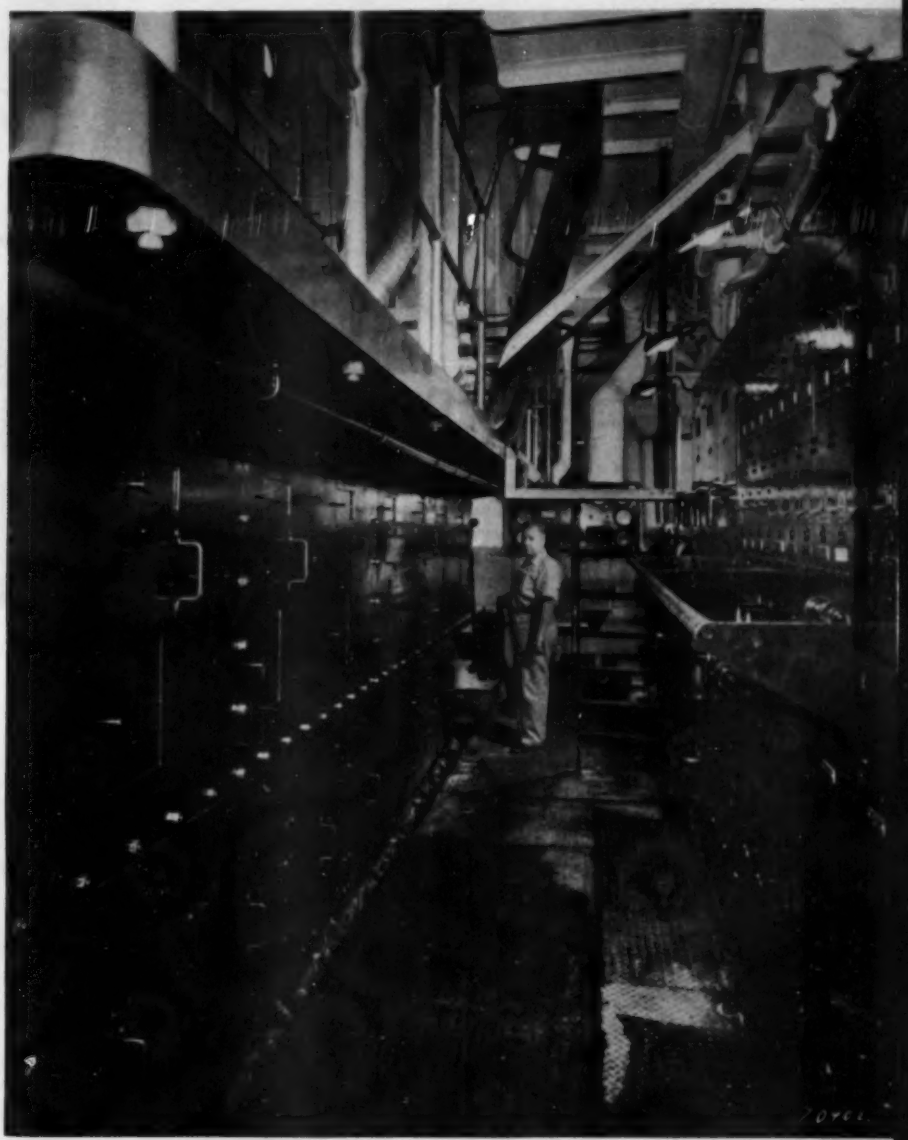
conversion were quite complicated in light of the tremendous amount of equipment removed and replaced. The *Empire*, soon to become the *Titan*, had excellent characteristics of balance and trim for sea towing, so much care had to be exercised to insure that the highly powered *Titan* would have the same qualities. As each piece of equipment, engine, tanks, steam lines, etc., was removed, it was weighed. This operation often required cutting operations to prepare the equipment for the scales. Then, as the new equipment was installed, accurate weights were kept so that the engineers

knew exactly how the ship had been changed. Calculations showed that the trim of the ship was as good as before, although she weighed slightly less. Removal of the high stack required for the boiler and the low center of gravity of the Nordberg diesel engine lowered the metacentric height. On paper, the *Titan* seemed to be a more seaworthy ship than before, but this was not enough to satisfy the men directing the job. The owners decided upon a stability test, so an inclining test was conducted under government supervision; and the *Titan* passed with flying colors.

Like the *Titan*, the Sabine Towing Company Inc. itself has a long record of achievement. The Company was organized in 1909 to engage in the furnishing of ship supplies; shortly thereafter engaged in harbor towing in the Sabine district, comprising the area of Lake Charles, Louisiana, Beaumont, Orange, and Port Arthur, Texas. Steadily, through the years, the size and range of activities expanded to include ocean-going and intercoastal service. Today, Sabine operates five harbor tugs, three coastwise tugs (of which the *Titan* is one), and twelve intercoastal tugs for work in the intercoastal waterways. The company owns 22 intercoastal barges and the big ocean-going barge now being handled by the *Titan*. Sabine also operates a fleet of oil tankers. Principal job of the sea-going tugs is to move oil from the Texas Gulf coast ports to other Gulf ports and to Atlantic ports. The demand is great and the tug *Titan*, with its heavy-duty Nordberg diesel, is meeting the challenge—365 days a year.

List of Principal Equipment

Engine—Eight cylinder, 16-in. x 22-in., heavy-duty Diesel developing 1750 hp. at 330 rpm. The Nordberg Manufacturing Co.
Supercharger—Elliott.
Governor—Woodward Governor Co.
Pyrometer—Alnor.
Jacket Water Heat Exchanger—Ross Heater & Mfg. Co. Inc.
Lube Oil Cooler—Ross Heater & Mfg. Co. Inc.
Lube Oil Filter—Honan-Crane Corp.
Lube Oil Strainers—Elliott.
Intake Silencer—Air-Maze Corp.
Exhaust Silencer—Maxim Silencer Co.
Auxiliary Generating Sets—15-kw. Hercules Diesel electric generator; 30-kw. Buda Diesel electric generator; 100-kw. Superior-Delco generator.



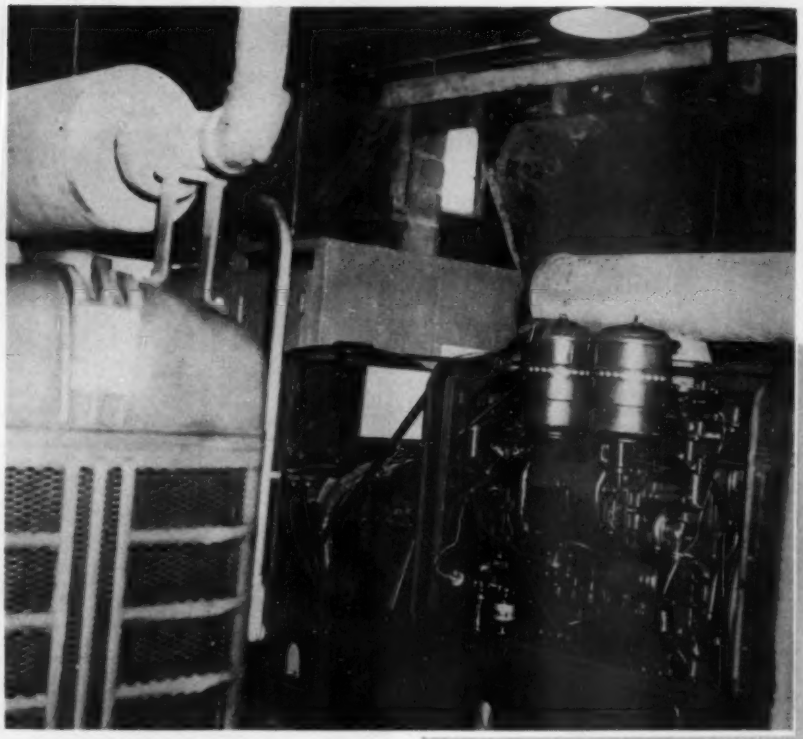
CHESAPEAKE ISLANDS ELECTRIC CO-OPERATIVE

By W. L. BODE

TWO islands in the middle of Chesapeake Bay now have access to modern living standards and working tools because of a group of diesel engines. The islands were settled a long time ago. They were noted by Captain John Smith, in the days when Pocahontas and Powhatan were giving us one of our most romantic bits of history. He named the southernmost island Tangier, since he found the Indians using clay there for pottery which was similar to clay he had seen on the Mediterranean. The island to the north was later named Smith Island, for Captain John himself. Permanent settlement dates back before 1700 and in the war of 1812 the British fleet was based there for the attack on Baltimore about which a young attorney named Francis Scott Key wrote a song which has become famous.

The islanders have always derived their livelihood from the Bay waters—fish, oysters, and especially crabs are still predominant in their economy. Because the 13 miles of water which separate them from the mainland in either direction constitute a substantial barrier to normal neighborly relations, the Islanders have had through the years a somewhat cloistered existence. The islands, and the islanders, have maintained a quiet charm which is rare in this modern world. But the 2,000 people who live in this spot have normal human hankerings for the conveniences which go with our modern standards of living. They want running water, electric lights, refrigerators, television sets, and all the other things that mainlanders take for granted. These things come with electricity. And the nearest power line ended at the water's edge.

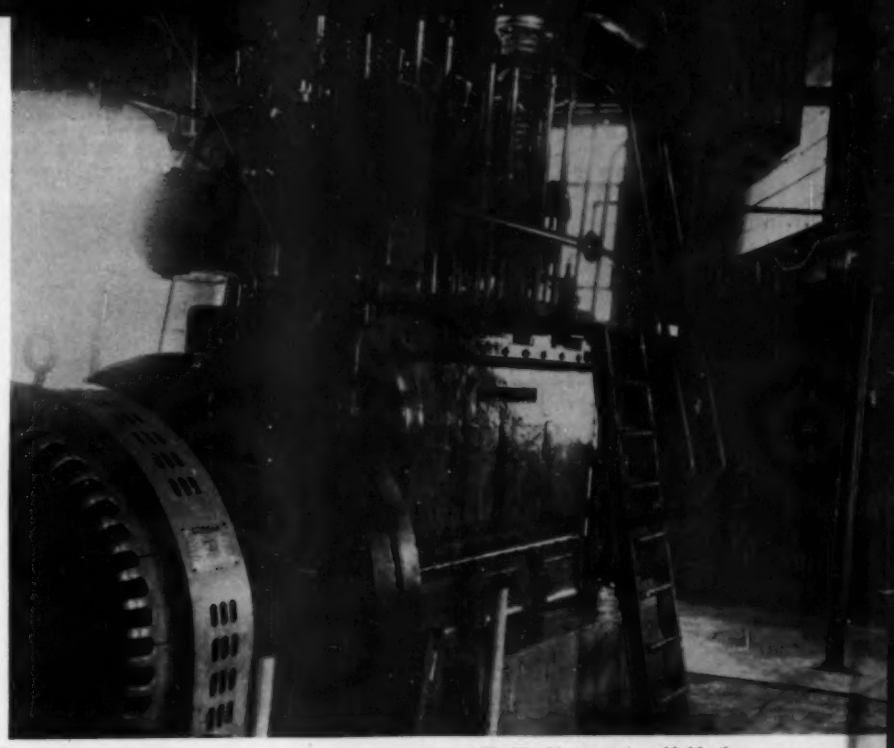
A number of years ago, the Tangier residents decided they wanted electricity. So they installed a diesel engine, which operated a few hours a day, most days, and provided direct current for about 70 of the island's 240 buildings. That was a whole lot better than not having any electricity at all, but it was not too satisfactory. Finally the plant burned out, and the little municipal plant was no more. After the war, interest in getting good electric service mounted. The Town Council decided to convert to standard alternating current, and bought two GM 90 kw units. When they came to remodel the mile or so of distribution lines that carried power from the engines to the homes, they ran out of money and decided to apply to REA for a loan. REA sent two or three field workers to the island, one after the other. Each of them took a quick look around, and came back with a negative recommendation. About that time the Smith Islanders were also making some efforts to get power, and also sent an inquiry to REA.



The original GM diesels.

The two islands are separated by perhaps 10 miles of open water, but except for a quarter-mile channel it is only about 18 inches deep. Somebody finally came up with the idea that the two islands might be connected together, and what would be difficult for either to justify separately might be feasible jointly. That's the way it worked out. REA approved loans now totaling $276,000 for a generating plant on Tangier, distribution lines on each island, and an over-water line connecting the two. The two little GM's were, of course, inadequate to the needs of the two islands together. But since they were already installed, they were incorporated into the new plant. To supplement the little engines, the newly formed Chesapeake Islands Electric Cooperative bought a second-hand 170 kw. Worthington engine from a co-op plant at Dayton, Virginia, where it had been serving since February, 1938. Appropriately enough, this was the first cooperatively owned and operated generating unit to go into service in the Western Hemisphere. The load has now grown to the extent that an-

other engine is necessary. Chicago Pneumatic is installing a 225 kw. unit alongside the old Worthington. With this new unit installed, it may be possible in the near future to move one of the GM units to Smith Island, for use in the event of an emergency breakdown of the overwater line. The islanders are using their new electricity very extensively. There are already more users than was expected at the time REA approved the line, and the average use is considerably above what was expected at this stage of the co-op development. The peak load comes on Monday and Tuesday mornings, indicating a complete change in the laundry methods of the island homes. There are refrigerated cases in the islands' food stores, a few television sets although the nearest station is almost 10 miles away, an increasing number of electric ranges and many other pieces of equipment. Out in the harbors of the islands are crab houses. These are small buildings on stilts, overlooking a protected area of perhaps 150 feet square which are filled with floating pens. Crabs brought in from the waters around the islands are placed in these pens, and shifted progressively nearer the crab house as they get closer and closer to time to shed their shells. The slight changes in appearance as the shedding stage approaches are not evident to



The Worthington engine added by the co-op a year ago.

The co-op power plant on Tangier Island.

the tourist, but an islander can look at a crab 10 feet away and in a foot of water and predict within an hour or so when the crab will shed. Unless the crab is scooped out of the pen at the time of shedding, or if he is left in any pen so long that his condition is weaker than that of the other crabs there, he may die; a newly shed crab is completely and utterly helpless for a few hours, and his market value declines precipitously toward the end of the helpless period.

Crabs are moved from one pen to the next continuously. Oil lanterns led to costly errors; now the harbors twinkle with electric lights suspended a few feet above the water, and the crab parade is sure and steady. Now the Tangier islanders are seriously considering a municipal water system. The islanders like their electricity. They take pride in participating in the affairs of the power system. It is theirs; they own it, and they have employed a smart-as-a-whip Tangier boy, Alonza Moore, Jr., to run it. Everyone calls him Junior—and everyone is proud of the job the diesels he runs are doing.

Diesel Equipment at Tangier

Two 60 kw. GM skid units, two-cycle, model 671, six cylinder, 1200 rpm., 90 hp.; alternator O'Keefe and Merritt Co., 60 kw., 60 cycle, exciter built into the alternator. Arranged with complete set of protective devices including for unattended operation.

One Chicago Pneumatic 225 kw., type 89-CP, four cycle, eight cylinder, 600 rpm., 327 bhp.; generator 225 kw., 5 kw. exciter. Arranged with complete set of protective devices including for unattended operation.

One Worthington 170 kw., type DS-3, three cylinder, four cycle, 360 rpm., radiator cooled, 250 bhp.

TUNA CLIPPER "ROYAL PACIFIC"

By CHARLES F. A. MANN

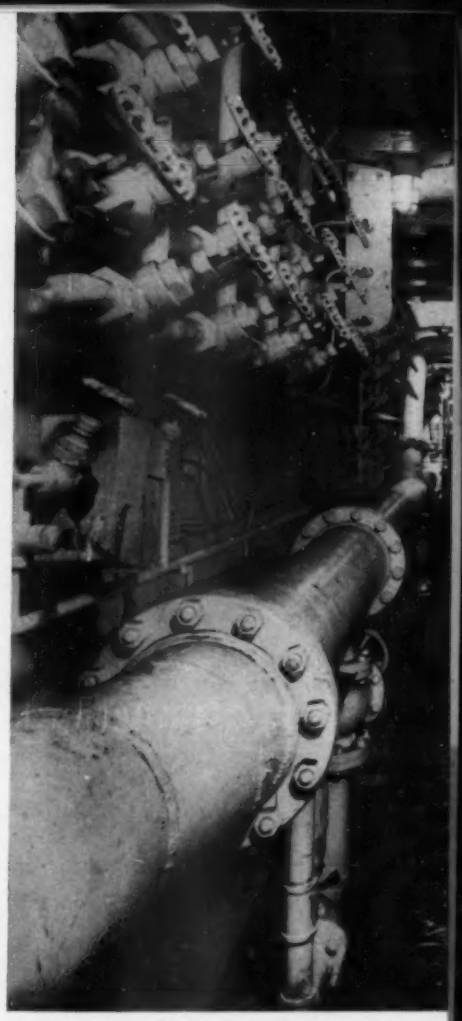
SECOND of three large, heavy-duty diesel tuna clippers to be completed at the J. M. Martinac Shipbuilding plant at Tacoma—after which some large, unique Navy orders take over the ways at 15th Street—has been delivered to the Southern tuna fishing fleet, and plans speeded to put the last 1951 Martinac clipper through on a speeded up schedule. The new clipper, the *Royal Pacific* is a medium large size craft 118 x 26 x 13 ft. 6 in. overall dimensions, and was designed by the yard's president, J. M. Martinac Sr., with construction details handled by J. M. Martinac Jr. Master is Andrew Morthland of Laguna, Cal.

Completely equipped with every power and navigation refinement, right down to clog-proof heat exchangers, radar set, 500 watt radiophone, Sperry electric steer and Sperry automatic pilot and full size power deck equipment, including Martinac anchor winch and Northern Line cargo winch.

The clipper will carry approximately 240 tons of frozen tuna in 10 wells and the three compartment deck bait box, with the usual combination piping arrangement to permit carrying fuel oil outbound in four of the fish wells and live bait in the deck boxes, then pack frozen tuna in all of them inbound. To provide the heavy refrigeration load when working in the subtropics, four Worthington ammonia compressors and miles of welded, galvanized brine piping, supplied with an even dozen Jacuzzi brine pumps.

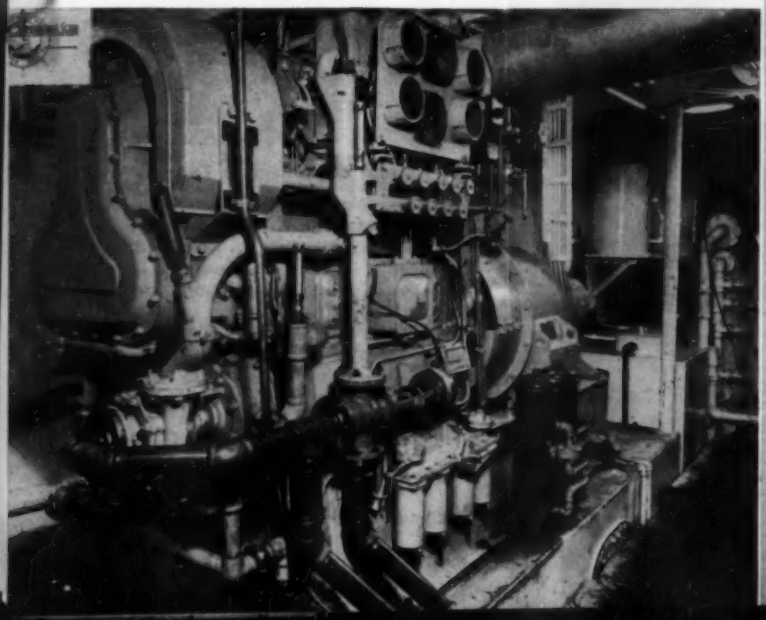
Main propulsion is a fully enclosed 615 hp. Superior diesel engine, direct coupled to a 3 bladed 39 x 66 in. Coolidge propeller. The Superior main diesel is fully enclosed and has 9 x 12 inch cylinders. All auxiliary electric generation and motors throughout the ship are ac. units, excepting a small dc. load to supply the deck winches, radio, radar and power steering. Two General Motors auxiliary diesels are fitted, each rated at 150 hp. and each driving a 100 kw. ac. 120 volt generator and a 25 kw. dc. generator, to give the ac-dc current supply. Auxiliary diesels are fitted for air starting to eliminate low voltage secondary battery circuits, and both main and auxiliary diesels are equipped with specially designed Wix heat exchangers of the shell and tube variety. The *Royal Pacific* will carry a crew of 15 men, plus the Captain, and will do about 11 knots loaded.

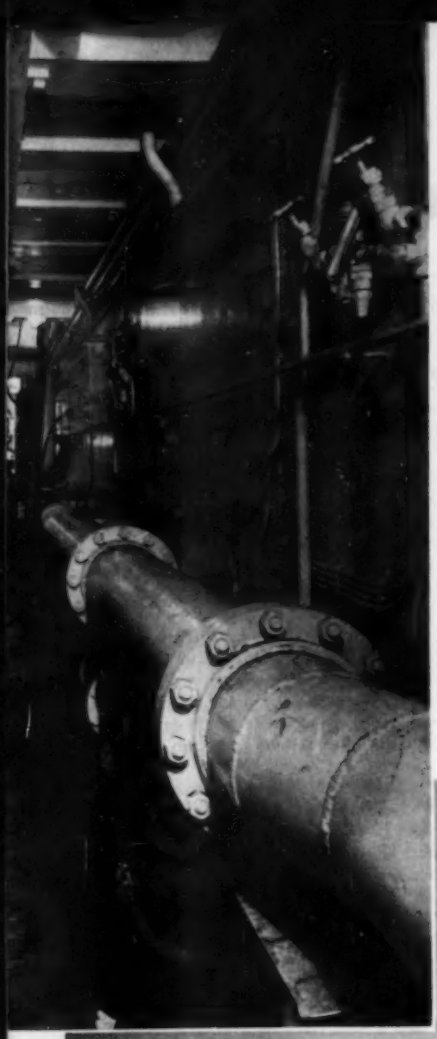
The pumping layout includes two large Fairbanks-Morse bait pumps; the 12 Jacuzzi brine pumps previously mentioned. Tank capacities are 40,000 gallons of fuel oil, 1200 gallons of lube oil and two refrigerated compartments for the galley, one a 500 cu. ft. walk-in type and the other a 350 cu. ft. galley freezer for handling frozen foods. The galley is elaborately equipped in the best Hotel Ritz style, including electric range, rubber and glazed tile and intercom outlets, and full power ventilation. Pacific Electronic supplied the radio; Submarine Signal supplied the fathometer and Driscoll Bros. the power tuna tender.



Looking down shaft alley between two sets of tanks and pump room.

One of the General Motors auxiliary diesels on tuna clipper *Royal Pacific*.





ROYAL PACIFIC

Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

Preventive Electrical Maintenance in Diesel Plants — Part II

FOREWORD: The following is a second article on the above subject. We are indebted to Mr. S. P. Bordeau of the Electrical Machinery Mfg. Company of Minneapolis for sending it in. This article and part 3 of the above subject material is taken from a paper prepared by Mr. G. L. Oscarson, Chief Application Engineer for the above company. It was presented the last week in July before the Iowa State College Diesel Power Plant Conference. It is so complete and to the point, that we feel it should be presented to our readers in detail, which will require the space allotted this section, in the next two issues and we are extremely thankful to the aforementioned gentlemen for this contribution. In presenting it to our readers it will be interspersed with comments by the writer.

"Preventive electrical maintenance in diesel plants is primarily concerned with diesel engine driven generators; exciters; motors for auxiliary drives, with their associated controls; and switchgear. The purpose of this article is to discuss some of the requirements of preventive maintenance. Obviously, it is not possible to go into any great detail; we can cover 'what' rather than 'how' and propose an objective, rather than establish detailed procedure. Preventive maintenance includes the following elements:

1. Proper storage prior to installation.
2. Proper installation.
3. Complete records.
4. Systematic maintenance.
5. Maintenance costs.
6. Maintenance personnel.
7. General knowledge of equipment characteristics; detection and removal of abnormal or harmful conditions.

"STORAGE: Before accepting shipment from the transportation company, examine crating to determine whether damage has occurred in transit. If crating is damaged, the machine may have been injured. If so determine the extent of the damage and immediately notify the transportation company and the vendor. If the machine is not to be installed as soon as received, it should be stored in a dry, clean place, protected from sudden changes in temperature and humidity. Care must be used in unpacking and handling to avoid injury. In cold weather after removal to a warm place, allow the machine to reach temperature of the room before uncovering. This will prevent condensation of moisture on the machine."

Writer's Comment: The aforementioned statement as to inspection before acceptance from the transportation company is very vital. During the years in which the writer was in service and erection work, many cases of injured equipment were noted due to "humping of cars" in transportation.

"INSTALLATION: Location of the generator or motor will be determined by the machine to which it is connected. If possible, it should be installed in a clean place with unrestricted ventilation, and accessible for inspection and care. It should not be installed where it is exposed to dripping water, excessive moisture conditions, sudden temperature changes, dust, dirt, or where inflammable or combustible materials may float in the air.

"COMPLETE RECORDS: An inventory number should be assigned, and a record card made out, for each generator, exciter or motor when installed. The number can be stencilled on the frame or a number plate attached. Fig. 1 shows a typical card. Cross out any parts not applicable to the machine in question. The data filled in will provide a ready means for determining machine characteristics, bearing size, brush data, etc. without the necessity of referring to the contract file. This card also refers to and serves as a record of past history in case a machine is moved from one location to another. On the rear of this card is kept a record of any work done, aside from normal maintenance. This would include bearing replacements, coil replacements, reinsulating jobs, paint spray or dip jobs, insulation dryout, commutator replacement, etc.; in fact, anything which would reflect on the character of the past service or future serviceability of the machine. Reverse side shown in Fig. 2.

"In addition to the inventory record card, a maintenance record, Fig. 3, should be used. This would not record any work of a weekly inspection nature, such as filling oil wells in sleeve bearing motors or brush replacements. However, it certainly would include such items as gap check, insulation resistance values, armature resistance and, in the case of generators, field coil resistance. The cards referred to above are permanent record cards, to be retained as long as the machine is in service.

"Also, a check sheet, Fig. 4 which is simply a check of normal inspection, should be prepared. This record would be kept by the operating department, and since each piece of rotating equipment has an inventory number, it will assure that each unit is inspected at least once a week. As each weekly or quarterly inspection is completed on each machine, it will be checked off the list."

Writer's comment on the above: The above comments merely substantiate statements made in pre-

Figure 1

ABC COOPERATIVE POWER ASSOCIATION

ELECTRICAL MACHINE RECORD

NO. _____

MOTOR—GENERATOR—EXCITER

LOCATION	DATE	APPLICATION	REMARKS
4			
3			
2			
1			

HP—KVA	FL. RPM	PHASE	CYCLE	VOLTS	FL. AMPS.	SERIAL NO.	MFGR.	TYPE	FRAME

ORDER NO. _____ DATE _____

MFGR. ORD. NO. _____

INST. BOOK NO. _____

BEARINGS—TYPE _____

FRONT END NO. _____

SHAFT END NO. _____

SHAFT EXTENSION

DIA. _____ LENGTH _____

KEYWAY _____ X _____ X _____

CONNECTION DIAGRAM

NO. _____

BRUSHES

NO. _____

SIZE _____

GRADE _____

MFGR. _____

CAT. NO. _____

OVER

TEMPERATURE RISE °C.

ARM. _____ FIELD _____

CONTROL

MFGR. _____

TYPE _____

INST. BOOK NO. _____

CONN. DIA. NO. _____

Figure 2

REPAIR RECORD

DATE	HOW DAMAGED	HOW REPAIRED	COMMENTS

vious articles in this section as to the necessity of complete plant records. However, I do want to take exception to Mr. Oscarson's second paragraph above concerning normal maintenance. I believe that it is just as vital to keep some record of normal maintenance as it is to record the special maintenance given equipment. We have found that a record of oil replacement, brush changes, cleaning periods, etc., carried on in daily operating practice is of vital import to us. Therefore, we feel we cannot overdo all phases of maintenance records, whether daily routine or special maintenance, records are essential to the best operating conditions. Mr. Oscarson presented several more records on transformers, relays, demand meters, etc., which we are not showing since we feel this work is more in line with transmission fields and not directly applicable to the plant itself unless transmission comes under plant supervision, which normally is not the case.

"SYSTEMATIC MAINTENANCE: A comprehensive maintenance schedule, rigorously followed, will prevent many shutdowns. A schedule may seem unnecessarily formal. However, if a 'hit or miss' casual inspection is followed some units will be checked often and some rarely, if at all. A suggested program, for rotating equipment, which must be modified to fit individual conditions, follows:

"Rotating Equipment Maintenance — Weekly: 1. Feel machine for evidence of vibration, listen for unusual sounds indicating rubbing of mechanical parts; check presence of moisture or unusual amount of dirt, dust, oil, or grease. Clean with low pressure air (30 psi.) if necessary. Check for presence of scorched odor indicating excessive temperature and possible insulation damage. 2. Feel bearing housings of sleeve bearing machines for excessive temperatures or vibration; check oil level. Oil if necessary, being careful not to over-oil. Check operation of oil rings. Check oil seals and see that oil is not being sprayed or thrown on the stator coils. 3. On anti-friction bearing units, feel the housings for vibration and excessive temperatures. Listen for grating or rumbling noise which may indicate bearing failure. Examine commutators or slip rings for signs of sparking or unusual surface conditions. If roughness or black spots are developing, clean with chalk stone. If the above inspection indicates any critical operating conditions, shut unit down for inspection and repairs."

Writer's Comment: Here again we feel that the above functions should be on a daily basis rather than on a weekly basis. Any efficient operator will make at least hourly rounds on his equipment in recording his readings of operating conditions on his log sheet. It takes only a little more of his time to check the aforementioned items on these rounds, and if checked hourly, many conditions are noted which might become more serious if allowed to go for a longer period. The writer feels that such a checkup on his rounds, is one of the duties and functions of efficient operating personnel.

"Quarterly Inspections: 1. Check bolted connections, brush pigtail connections, cable connections, brushholder and brushholder studs for tightness. 2. Check brushholder clearance to commutator, or collector rings, check brushes for proper freedom of movement, check brush pressure. Replace worn, chipped or cracked brushes, sanding in the new ones to fit the curved surface. 3. Check field coils to see that they have not dried out and become loose. 4. For ball bearing motors on continuous service, add lubricant, being sure to get some new grease to the balls or rollers. Be careful not to over-grease. (This does not apply to sealed cartridge bearings. Follow the manufacturer's instructions.) 5. Check oil wells, on sleeve bearing motors, for sludge or dirt. Flush and refill if dirty. 6. Check coupling alignment on flexibly coupled units. 7. Check belt tightening rails on belted units. If all adjustment is used up, shorten or replace belts. Check geared units for gear wear and back lash. 8. If machine is dirty, blow out with low pressure air. If coils are dirty, oily or greasy, wipe off clean with solvent."

Writer's Comment: We agree entirely with the foregoing suggestions. However, we feel that weekly inspections should be made of brushes, brushholders, tension and cleanliness around brush rigging.

"Annual: 1. Check and record air gap at four points at both ends of machine. Compare with prevoius readings. Air gaps should be equal within 10%. Examine surface of rotor for any evidence of rubbing. 2. All bearings (except sealed cartridge type) should be removed, cleaned, and inspected; defective ones replaced. Repack grease lubricated bearings. 3. Check insulation resistance with a 'megger' and compare with previous values. 4. Check for loose or broken squirrel cage bars on squirrel cage motors. Examine commutators for high, low or loose bars. Check riser connections. Check V-rings for tightness. Undercut mica if necessary. Check slot wedges to see that they have not dried out and loosened. Clean thoroughly between the risers, around the collectors rings, etc. If rings or commutator are eccentric or spotted, turn true. 5. Check coil lashing or banding. Check for evidence of coil loosening or shifting. 6. Clean all coils thoroughly, first blowing off with air (not over 30 psi. pressure) then washing with carbon tetrachloride, if necessary, to remove oil. Use carbon tetrachloride sparingly, and in a well ventilated place. Wipe coils thoroughly as otherwise insulation may be softened and damaged. Be particularly sure that junction of coil and core is clean. Many coil breakdowns occur at that point. Examine coils for evidence of brittleness or cracking. Clean all air passages. 7. Check brushholders on D-C machines to see that they are all set at the proper angle, that they are properly spaced, and that the brushes are set at the neutral point on the commutator."

Writer's Comment: Here again we agree fully with Mr. Oscarson. However, we will suggest that there are solvents on the market, which will do an excellent cleaning job, but which are not as likely to soften up the insulation as carbon tetrachloride will if not entirely removed. Also these solvents can be used in more confined places than it is advisable to use carbon tetrachloride.

"Biennial: Every two years dismantle machines completely, and clean thoroughly. Measure phase to phase resistance; also measure field coil resistance. Dip and bake rotors, revolving armatures, field coils, and stators which can be so handled. Stators or rotors which are too large for dipping should be given a good spray coat of air drying varnish."

Writer's Comment: The foregoing finishes the first half of Mr. Oscarson's paper. The second half will appear in the next issue of DIESEL PROGRESS. One other comment should be made and that is with regard to meggering resistance of units, leads, etc. Many small plants do not have the equipment to carry out this function, but all insurance company inspectors do have it and it should be requested that when making inspections, they give the plant a full report on these conditions. Many of them do this and record their findings in their reports.

Figure 3

INSPECTION AND MAINTENANCE RECORD No._____

DATE	AIR GAP CHECK								INSULATION RESISTANCE		LOAD CHECK Amps/Phase			MOTOR STARTING TIME
	Front End				Shaft End									
	Top	Right	Bottom	Left	Top	Right	Bottom	Left	Temp.	Res.	1	2	3	Seconds

Figure 4

INSPECTION RECORD 19____

No.	* Jan	Feb	Mar	* Apr	May	June	* July	Aug	Sept	* Oct	Nov	Dec
1												
2												
3												
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WEEKLY CHECK — Vibration · Rubbing · Excessive Temperature · Sparking · Oil Level · Grease Fed Bent. & Bearings.

*QUARTERLY CHECK — Connections · Brushes · Fixed Coil Tightness · Alignment · Belt Tightening Rails · Grease Anti-Friction Bearings · Clean V Rings · Clean · Check Starter Contacts, Relays, & Temperature

NEW CATALYTIC PROCESS

By **WILBUR W. YOUNG**

THE Sola Catalytic Process was introduced to the diesel industry at the twenty-third annual Conference of the Oil and Gas Power Division of A.S.M.E. at Dallas, in June. This process for treating industrial and potable water was invented in France just prior to World War II by Andre Barbier and has been used extensively in Europe and North Africa during the past ten years.

It is claimed that the Sola Catalytic Process does not change the chemical structure of water but rather it sets up an increase of molecular magnetic susceptibility of water thus creating a dispersion of the elements (mostly impurities) that cause rust, scale and corrosion. The principles on which this process is based and its end effect should prove interesting to many who were unable to attend.

The molecular magnetic susceptibility of matter is a constant which is a function essentially of the nuclear structure. This applies to all substances be they paramagnetic or diamagnetic. If for example a substance (atom) has a permanent magnetic moment and the material is therefore paramagnetic, it is still true that its susceptibility has the diamagnetic component given by Langevin's equation: $Xa = Ne^2Zr^2/6mc^2$. The susceptibility being positive in paramagnetic substances and negative in diamagnetic substances. The molecular diamagnetic susceptibility of water at 20 deg. C is 0.7128×10^6 and increases 0.013% per degree C.

When water normally used for industrial or potable purposes comes in contact with the Sola Catalytic cell, a para-ortho hydrogen conversion is created instantly. The ortho hydrogen acts on oxygen so that it becomes a very active element. Oxygen is a strong paramagnetic gas. These two activated elements, the ortho hydrogen and the activated oxygen then act on all the paramagnetic elements that exist in water. Most of the impurities in water are paramagnetic.

All of the paramagnetic elements activated by the Sola Process in water create an increase in the molecular magnetic field which disperses all of these activated elements and they remain dispersed after precipitation. This dispersion prevents the formation of the sticky hard scale in the water carriers. The precipitated elements, in the dispersed forms, then move easily with the natural flow in the carriers and all are eliminated by draining.

The SOLA CATALYTIC PROCESS by creating the above increased molecular magnetic field will keep water in a state of treatment over a period of 48 hours and will so remain and can be carried in that condition over great distances through the usual carriers. If, for instance during this 48 hour period, the speed of the flow of water in the carrier could bring it to a point hundreds of miles distant from the inception of the treatment, it will be found that the same efficiency of treatment exists at the end of this distance as it did at the source.

SCALE. As to the already existing scale and corrosion, these are all formed by impurities of the water and are paramagnetic elements. The activated water created by the SOLA CATALYTIC PROCESS activates the layer of scale with which it first makes contact and causes a microscopic swelling of these layers. The enlarged layer created by this swelling process is then subjected to a process of dispersion and gradually depolymerizes into the flow of water. It must be understood that this swelling process, layer by layer, and the resultant elimination is a slow process and each layer receives the same treatment until all of the scale is removed.

CORROSION. By removing the deposits of iron oxide, the galvanic current that it creates is reduced in direct proportion to the size of the deposit by the iron oxide and thus reduces the corrosion. The fact that the elements are dispersed by the SOLA CATALYTIC PROCESS in itself reduces their corrosive tendencies.

ALGAE. Algae is a growth that originates from germs that either exist in water or comes into water from out of the air. Some types of these germs find their most fertile breeding ground on deposits of scale formation. By removing the scale by the Sola treatment, the breeding places for certain types of these algae are eliminated.

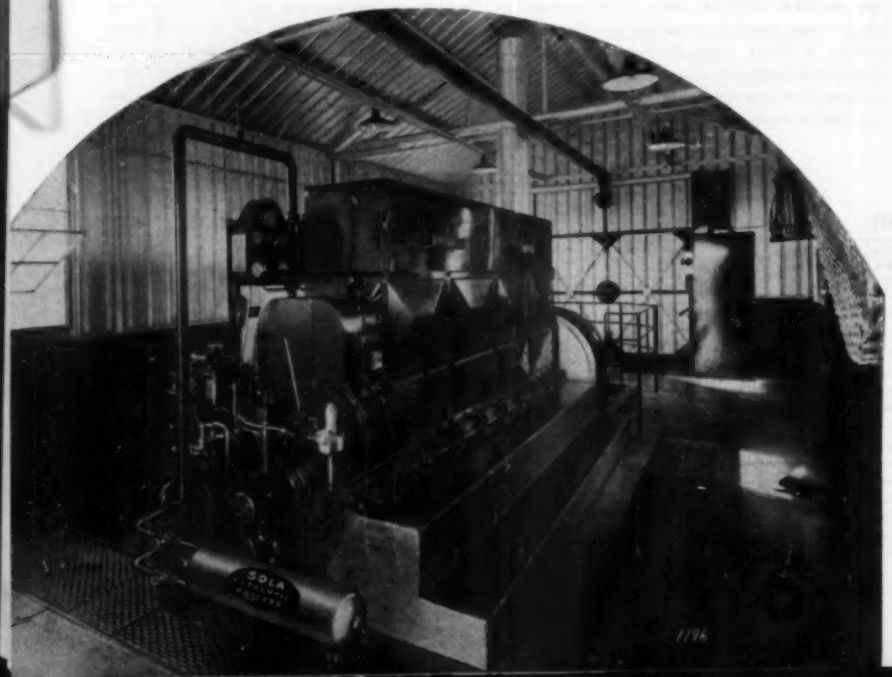
ODORS. Odors are generally created by deposits in the water carriers which deposits take the form of scale, some types of algae, humus, etc., and by the introduction of chlorine for combatting the bacteria, a chemical reaction occurs. The combination of the chlorine with the humus or certain algae creates a phenol that increases the unpleasant odors. Through the use of the SOLA CATALYTIC PROCESS, the humus, scales and some algae are removed and thus the odors decrease.

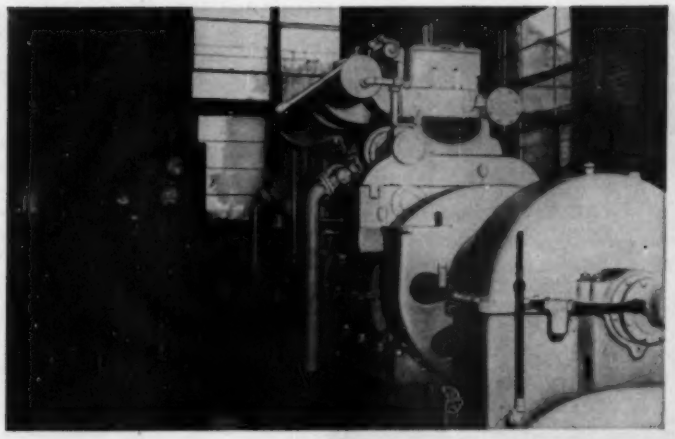
TURBIDITY. By the dispersion created by the SOLA CATALYTIC PROCESS the elements that give water its turbidity having been dispersed, the water takes on a crystal clear optical appearance.

ELECTROLYSIS. Electrolysis of piping and mechanical equipment has been a problem in many circles of mechanical engineering, but the difficulty of electrolysis is real and should be avoided and if possible, eliminated. The SOLA CATALYTIC PROCESS does not cause any electrolysis in any part of an entire installation.

The active element used in this process is hermetically sealed within a metal cylinder and the cylinder is simply introduced into the system. Thus no chemicals nor any other materials are added to the water.

Full details regarding the application to the Diesel Industry of the Sola Catalytic Process may be obtained by writing to File 91, DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, Calif.





21,716 hours without forced shutdown ...and still going strong

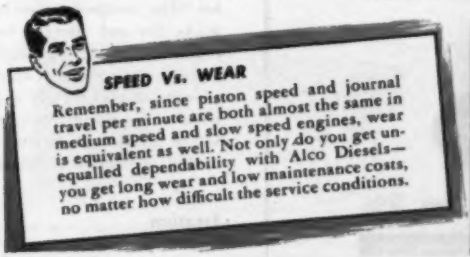
that's the record of this Alco Diesel Engine at Barnett Station of Shell Products Pipe Line

Listen to Mr. C. C. Curvey, chief operator at Barnett, Ill., speaking:

"The unit operates 24 hours a day and is never shut down except for the annual routine inspection and overhaul. . . . Not only have we boosted capacity of this line 15%, but operating and maintenance costs have been much reduced."

The Barnett station is equipped with a single Alco diesel—replacing a total of 3 old-type engines. This rugged Alco diesel provides power for pumping 1,050,000 barrels a month through the 8-inch pipe line. It's a 6-cylinder, 4-cycle engine with 12½ inch bore and 13 inch stroke, rated at 810 hp and 650 rpm.

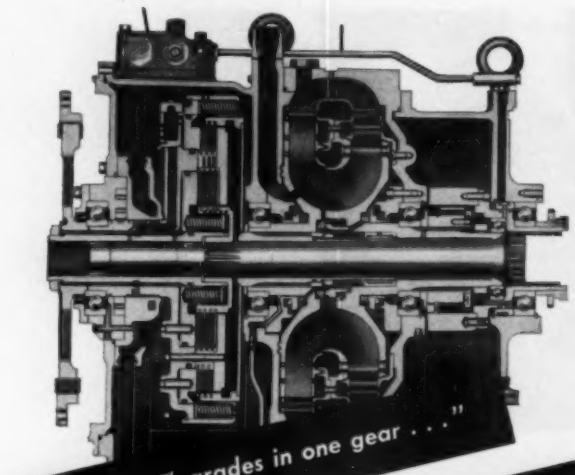
Such power and performance can be yours, too, if you install Alco Diesel Engines to meet your pipe line pumping requirements. Your nearest Alco engineer will be glad to help. Call him today at sales offices in New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady, St. Louis.


SPEED Vs. WEAR
Remember, since piston speed and journal travel per minute are both almost the same in medium speed and slow speed engines, wear is equivalent as well. Not only do you get unequalled dependability with Alco Diesels—you get long wear and low maintenance costs, no matter how difficult the service conditions.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY



"Takes 13% grades in one gear . . ."

"Lets the engine do 90% of the braking . . ."

"Substantial savings on axles, tires and brakes . . ."

Model DF

Twin Disc Hydraulic Torque Converter

"Field reports of the Twin Disc Three-Stage Hydraulic Torque Converter with Direct Drive feature, in big heavy-duty trucks, are proving that 99% of forward gear shifting can be eliminated in off-highway operation. Extensive tests on the Mesabi Iron Range in this Twin Disc equipped Dart truck indicate that these converters can significantly reduce time on hauling cycles on this, probably the world's toughest trucking, with loads up to 30 tons and grades up to 13%. Furthermore, very *substantial* savings on axles, tires, gears and brakes are reported."

That is the first paragraph from a just-published four-page bulletin on the *new* Twin Disc Model DF Three-Stage Hydraulic Torque Converter.

You'll want the complete story because never before have so extensive tests been reported on three-stage hydraulic torque converters with an *in-built* braking feature which no other torque converter can claim. Write today, and be sure to ask specifically for Bulletin No. 162. It may show you how to save thousands of dollars in truck operation.

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

Awarded Medal

Hermann Lemp

The Franklin Institute has awarded the George R. Henderson Medal to Hermann Lemp, of Ridgewood, New Jersey, for his contribution to the development of the diesel-electric locomotive, it was announced by Dr. Henry B. Allen, executive vice president and secretary of the Institute. Formal presentation of the award will take place on October 17 at special ceremonies in Franklin Hall, at which a number of other honors will be presented to distinguished scientists of the United States and Europe.

The Henderson Medal, founded in 1924, is a gold medal given for meritorious inventions or discoveries in the field of railway engineering. Dr. Allen said that the certificate accompanying the award to Mr. Lemp states it was given "in view of his basic contributions to the electric transmission through field control, thereby improving the performance characteristics and engine loading of diesel-electric locomotives." Mr. Lemp has been affiliated with the General Electric Company, The Erie Steam Shovel Company and the Locomotive Department of the Ingersoll Rand Company. It was while he was with General Electric that he developed the electrical transmission which earned him the award.

First of Truck Type

L. W. Jackson, motor maintenance supervisor, Hercules Powder Company, Bessemer, Alabama, climbs into the cab of one of the first L-190 International trucks to be powered by a 150 hp. model JBS-600 Cummins engine. The JBS-600 is the newest member of the Cummins automotive line and has been designed primarily for medium-duty trucks, city and inter-city bus applications. The engine is a six-cylinder, four-cycle, full diesel with a piston displacement of only 401 cubic inches at a weight of 1745 pounds, and develops its horsepower at a speed of 2500 rpm. An insulated body will be installed on the truck by Hercules for the hauling of commercial dynamite.

Erratum

In the story which appeared in the August issue of DIESEL PROGRESS on the Goodland, Kansas municipal power plant, we erroneously credited the pilot oil to the Shell Oil Company. We have been advised that the pilot oil in this installation is supplied by the Shallow Water Refining Company of Garden City, Kan. We offer our apologies.

74 More Engine Coolers for Alcoa

For more efficient engine cooling, for more aluminum production, the Aluminum Company of America has again called on Trane Dry Type Fluid Coolers. Now *almost 200* of these units will cool lube oil and jacket water of the big radial engines at Alcoa's reduction plant in Texas.

Almost 200 giant Trane Fluid Coolers will provide complete engine cooling efficiency without using water and requiring only a minimum of power!

These units can cut gas or diesel engine cooling costs to the quick. With flat plate-type fins and round tubes, the core of the unit offers less resistance to the air flow, so the unit needs less horsepower to do its cooling job. Heat transfer is faster and more efficient, too. That's because the fins are mechanically (and permanently) bonded to the tubes, and because the fin collars form a continuous sheath around the tubes.

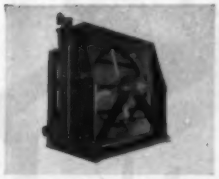
A wide variety of standard core headerings are available, so the Trane Fluid Cooler can provide just the circulation and heat transfer rate desired.

There's no water to treat or sediment to remove with Trane dry type fluid cooling. Core headers and tubes are easy to reach and clean, and the fan motor is conveniently placed.

Ruggedly built, these units can take the strains and shocks of mobile and outdoor installations without extra bracing.

The units are available in horizontal air stream models, in 14 sizes with fan diameters of 18" to 120" and vertical air flow models in 8 sizes with fan diameters from 72" to 144". Trane Fluid Coolers have steel casings, aluminum fans, copper or aluminum tubes and aluminum fins. The units can also be furnished in other materials and constructions.

Capacities range from 66,000 to 7,600,000 Btu per hour.



Rugged casing and motor support construction of horizontal air stream model.

Trane GC Fluid Cooler. Air flows upward through core, unaffected by wind direction.

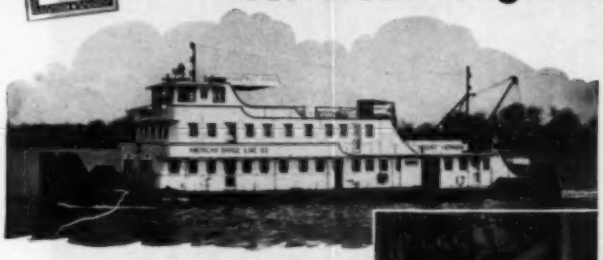
Horizontal air flow Fluid Cooler, available in 14 sizes, either blow-through or draw-through fan.

TRANE

MANUFACTURING ENGINEERS OF HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS.
Eastern Mfg. Division, Scranton, Pennsylvania
Trane Company of Canada, Ltd. . . . Toronto
OFFICES IN 80 U.S. and 14 CANADIAN CITIES

Here's low cost *Life Insurance* for diesel engines



NUGENT FILTERS for fuel and lube oil

The amount of protection afforded by fuel and lube oil filters is dependent upon the effectiveness of the filters... and all filters are not equally effective. You'll see what we mean if you'll compare Nugent Filters with any others. By actual test, Nugent Absorbent Oil Filters remove 99.8% of the dirt. Dirt and carbon particles as small as a few microns are removed and prevented from getting to those areas where they can accelerate wear and shorten engine life.

Size for size, Nugent Filters offer greater filtering area. In addition, they make possible a choice of full flow or by-pass filtering with the same unit. Recharges are inexpensive and easy to install. Simple piping makes installation no problem.

Write for descriptive literature that shows how to insure the long life of your diesel.

Three 720 H. P. Cooper—Bessemer Diesel powering the American Barge Line Company's new "Mount Vernon", illustrated above, are equipped with Nugent Filters for fuel and lube oil, helping to assure the owners that they will get all the fine service these engines are designed to give.

Above—One of the Nugent Duplex Fuel Oil Filters installed on the "Mount Vernon." Below—A Nugent Lubricating Oil Filter of the type used on the "Mount Vernon."

Wm. W. *Nugent* & Co., Inc.
415 N. Hermitage Ave. CHICAGO 22, ILLINOIS

OIL FILTERS, ENGINE AND METERING SYSTEMS, MECHANICAL OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Established 1891

Diesel-Made "Rain"

During an extended dry period, Meyer Heller, a rancher near Ft. Pierce, Florida, had the unpleasant experience of watching his pasturelands dry up and his cattle search in vain for fresh, green grass. As Mr. Heller was highly overstocked for his acreage at the time, this unusual lack of rainfall was rapidly becoming a serious emergency. Relief was found in time but it was not in the form of a heavy rainstorm. It was a diesel engine and a pumping unit which in a matter of 12 days was able to put the equivalent of two inches of rainfall over Mr. Heller's 760 acres. The rainmaking equipment Mr. Heller installed consisted of a General Motors 2-cycle diesel engine, a Berkeley portable pump, 1,200 feet of irrigation pipe and two Rainbird sprinkler heads. Two six-inch wells provided a good supply of water. The GM diesel, a 4-cylinder model, was compact and light enough to be moved easily on a small trailer.

Pumping day and night at the rate of 1,000 gallons per minute the new equipment soon restored the grasses on Mr. Heller's land. In fact, such a heavy growth resulted that the equipment was soon no longer regarded merely as "standby." More and more use was made of it as Mr. Heller realized it was no longer necessary t owait even a day for needed rainfall. Used more frequently it helps bring on new grass and replaces the old fast enough to take care of more than the usual number of cattle to the acre. In addition, Mr. Heller has improved the quality of his grass and his stock now thrives on fresher grasses of higher nutritive value. Reason enough, according to Mr. Heller, to give the "standby" diesel practically a full-time job.

For quiet Power Plant operation

specify Burgess-Manning Snubbers

to eliminate engine exhaust noise

● Wherever Diesel-electric power plants are located . . . whether engines are large or small . . . reliable Burgess-Manning Snubbers are ideal for effectively reducing the annoying roar of engine exhausts to the noise-level of the surrounding area. By snubbing the exhaust "slugs" through successive snubbing stages, the gas is smoothed to a unidirectional flow. Noise is reduced. No interference with efficient engine operation.

To reduce engine exhaust noise . . . for quiet surroundings . . . install Burgess-Manning Snubbers—guaranteed performance backed by a reliable organization. Consult with the Burgess-Manning engineers, today.

BURGESS-MANNING COMPANY

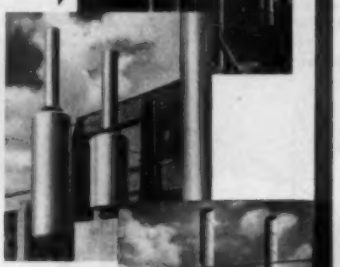
LIBERTYVILLE, ILLINOIS

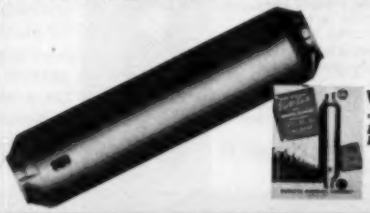
MEXICO—Nordberg Diesels equipped with Snubbers

MICHIGAN—Nordberg Diesels equipped with Snubbers

NEBRASKA—Fairbanks-Morse Diesel engines equipped with Snubbers

WISCONSIN—Three Burgess-Manning Snubbers on Worthington Diesels





OHIO—Municipal light plant equipped with Exhaust Snubbers

WRITE FOR BULLETIN

"Bring Your Plant Up to Date With Burgess-Manning Heavy-Duty Slug Buster Snubber."

MICHIGAN—Diesel Electric Power Plant equipped with Snubbers on Fairbanks-Morse engines

Research on Tire Wear

As an outgrowth of complaints that driving wheel tires on diesel equipment were not giving satisfactory service, the General Tire and Rubber Company as a result of some research came up with the following answer: Drive wheel tires will and do give as much mileage on a diesel truck as on a gasoline truck of comparable horsepower rating if drivers are taught to handle the truck properly and use—not abuse—the great amount of power that is available at comparatively low engine speeds. At 1000 rpm., the usual take-off speed of the engine for a loaded truck with a 160 hp. engine, the gasoline engine develops only 75 hp. while the diesel develops 105 hp. or 40% more. The torque curve differs in about the same ratio. At 1000 rpm., the gasoline engine develops 360 ft. lbs. torque at the rear wheels while the comparable diesel develops 540 ft. lbs. torque at the same engine speed. It can easily be seen from this that the driver who races a diesel engine in starting or accelerating too much or too fast before shifting to a higher gear is wasting fuel, shortening engine life and wasting tire mileage. Whenever a problem of so-called fast wear occurs on diesel equipment, it is not the tires, it is not the truck. It is a matter of driver education.

The report also gives five tips on tire conservation and tire safety. (1) Check inflation before every trip. Check it while tires are cold. Improper inflation shortens tire life. (2) Never bleed tires on the road. A running tire creates heat which increases pressure. This is a normal event and the tire manufacturer has allowed for it in building the tire. (3) Avoid high speeds on rough roads. (4) Avoid hitting rocks, wood, holes, curbs or anything which gives tires a sudden sharp blow at one point. (5) Check for flats on the road. Flat tires on a dual must be changed as soon as possible to avoid ruining the good tire and to prevent a tire fire.

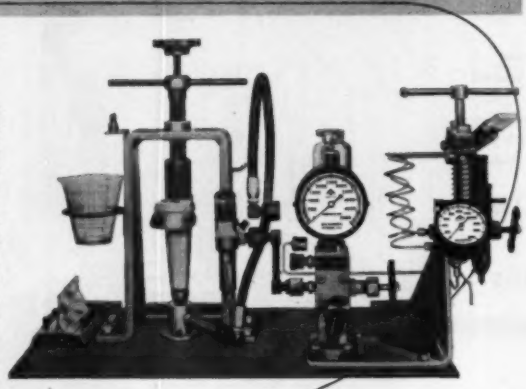
THE MOST COMPLETE LINE
of Diesel Nozzle Testing Equipment
EVER OFFERED!

For AUTOMOTIVE DIESELS

A completely self-contained, easy-to-use and compact test set for checking nozzles and injectors of all Diesels up to 60 hp per cylinder. The heart of this test set is the Bacharach Nozzle Test Pump located in the center. Nozzles made by American Bosch, Bendix, Caterpillar, International Harvester, etc. are attached directly to test pump by means of steel tube and union nuts. Cummins injectors are held in test fixture at left; GM 71 injectors in test fixture at right. These fixtures have individual fuel pressure lines which may be interchangeably connected to test pump.

Test Set includes Connector Set 44 comprising connector tube, Ermeto adapter and fuel inlet connecting nuts for all American Bosch R, S and T size nozzles and similar size nozzles of other makes.

Write for Leaflet 901



For HEAVY DUTY DIESELS

An exceptionally versatile and convenient test set for checking nozzles and unit injectors of medium and large bore and stroke Diesel engines for marine, railroad and general industrial applications. Test set comes complete with fuel inlet connection fittings for American Bosch T, U and V size nozzles, Bendix-Scintilla C and D size nozzles, Fairbanks, Morse nozzles for 38D8-⅛ engines, and Electro-Motive 567 and 278A injectors. Fuel inlet connections to suit other specific requirements furnished promptly on receipt of specifications.

Write for Bulletin 634

This equipment is available in the two complete test sets illustrated, or may be purchased selectively in group assemblies for testing a particular type or related group of nozzles or injectors.

BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7000 BENNETT STREET • PITTSBURGH 8, PA.

Sealed Power Appointments

R. B. Hawkins

William Van Dam

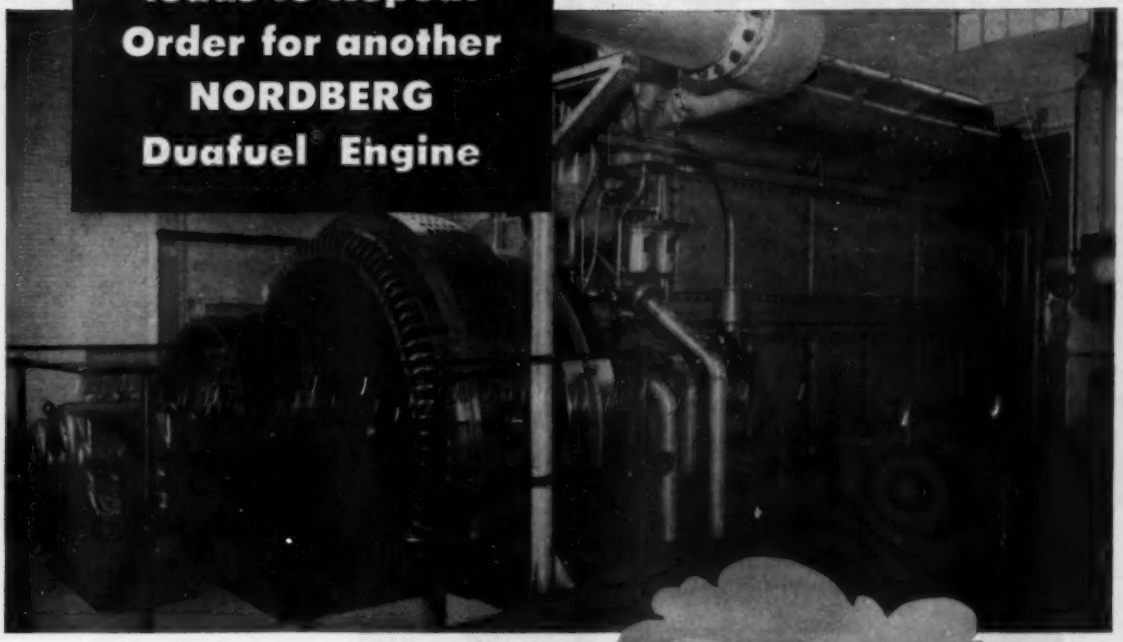
The appointment of Robert B. Hawkins as manager of the Detroit Office of the Sealed Power Corporation has been announced by R. A. Snyder, sales manager, Original Equipment Division. Mr. Hawkins replaces E. C. Beck, who has been assigned to special duties in the Muskegon Office. With Sealed Power since 1940, Mr. Hawkins has been assigned to sales engineering work since 1942 in Rochester, New York, Detroit and Muskegon. He also served two years on the Engineering Staff in Muskegon. Mr. Hawkins is a graduate of Brown Univeristy, 1935, and is a member of the Society of Automotive Engineers and the American Society of Mechanical Engineers. Mr. Snyder also announced the assignment of William Van Dam to the Detroit sales engineering staff. Mr. Van Dam has been in the Sealed Power engineering department since 1938 with the exception of two years, 1944-1946, when he served as Motor Machinist Mate in the U. S. Navy. He has been doing sales engineering work since June, 1950 and is a member of the Society of Automotive Engineers.

The Hilco High Pressure Oil Filter

Illustrated is the Hilco high pressure oil filter for filtering lubricating and sealing oil on centrifugal gas compressors and oil pumps on pipe lines and other applications for working pressures up to 1500 pounds. Oil enters inlet and is forced through a filter cartridge which is available made of Fuller's earth or cellulose. The filtered oil passes to the oil seal or supply tank as required. Clean oil free of solid and abrasive matter protects against scouring of bearings and mechanical seals. The Hilco high pressure filters are available in capacities starting at 1 gpm. to practically any flow desired. For further information write to the Hilliard Corporation, 122 West 4th Street, Elmira, New York.

OUTSTANDING PERFORMANCE leads to Repeat Order for another NORDBERG Duafuel Engine

NORDBERG unit at Culpeper, Virginia saves over $9000.00 a year in fuel costs!



IN 1934, the town of Culpeper, Virginia, switched from public utility power to its own Diesel powered generating plant. As the load grew, additional generating capacity was added, the latest addition being the 1220 hp Nordberg four-cycle Supercharged Duafuel engine which was placed in service in 1948. This oil and gas burning Duafuel unit is now producing power at the lowest cost in the 16-year history of this municipal plant. Generating more than 63 percent of the plant's total production, the 1220 hp Nordberg is saving more than $9000.00 a year on the cost of fuel alone as compared with the average performance of the oil burning Diesels in the plant. In addition, important economies in lubricating oil and maintenance have been effected.

You can benefit from the experience of municipalities like Culpeper . . . by switching to NORDBERG power. Sizes for every application, from 10 to 9600 hp. Write for details, outlining your power requirements.

NORDBERG MFG. CO., Milwaukee 7, Wis.

The Culpeper municipal plant has become a major civic asset, with its success based on sound engineering and sound management. It is characteristic that this plant should now feature a thoroughly modern generating unit which utilizes the most economical fuel available.

It is highly significant that Culpeper has now ordered another Nordberg Duafuel Engine as a direct result of their previous experience with this type of Nordberg Duafuel power.

P251

NORDBERG DIESEL ENGINES

Moves General Offices From New York

On September 1, 1951, The Griscom-Russell Co. moved its general offices from New York City to Massillon, Ohio, where the Company's plant for manufacturing heat transfer apparatus of all types is located. The move has been made to centralize the administration, general sales, engineering, development and other departments of this 84-year-old business for most efficient operations and service in the interest of the national defense effort and customers. To accommodate the various departments, a new office building is being erected on the grounds of the company's plant opposite the Massillon station of the main line of the Pennsylvania Railroad. The company's plant has sidings on three railroads, is served by numerous trucking lines, and is in the heart of an established manufacturing district close to raw and semi-finished material markets. The Griscom-Russell New York office at 285 Madison Avenue will continue to operate as one of the more than 25 sales offices in the United States.

Worker and Student Courses

Industry is stepping up its giving of comprehensive courses of instruction and orientation for newly hired, college-graduate workers—and for older hands also. In great part this trend has been stimulated, according to Brown Instruments Division executives of Minneapolis-Honeywell, by the increasing tempo of the defense effort. In chronological sequence Honeywell's Brown Division has this year concluded several special courses for different groups of its own and customer personnel. The company included courses in late spring and early summer for a group of more than 100 newly graduated engineers that have been added to the Brown staff. It has just closed a seminar, the second in two years, for the faculties of colleges and technical schools.

Pneumatic Tire Fork Lift Truck

Supplementing their line of fork lift trucks in capacities from 2000 lb. to 6000 lbs., are the new pneumatic tire models FPB20-24 and FPB20-15 fork trucks now being manufactured by The Buda Company, Harvey, Illinois. Rated at 24" and 15" load centers, the new Buda pneumatic tire 2000 lb. capacity fork trucks have many features for fast handling, operating economy and low maintenace. Features of Buda's models FPB20-24 and FPB20-15 fork trucks include: carriage mounted on patented adjustable side thrust rollers to eliminate wear; extra strength and self-aligning mast; single lever two speed forward and two speed reverse gear shift, complete complement of gauges and switches on full front vision instrument panel; and quick change heavy duty clutch. Powered with a 4 cylinder, 61 cubic inch displacement engine, the fork lift trucks are available in five standard masts with a lift of 72, 84, 108, 114 and 120 inches. For an illustrated specification bulletin, write The Buda Company, Harvey, Illinois.

CONTROL POWER BETTER

Get the RIGHT Clutch for YOUR Need
There is no one stock answer to every power transmission control problem. That is why ROCKFORD clutch engineers can be of practical help in designing an application that will increase your product's efficiency—make a substantial saving in cost and reduce servicing down-time. Send a print or description of your need for their recommendations, based on the extensive ROCKFORD line of clutches, power take-offs and speed reducers.
BW

ROCKFORD CLUTCH DIVISION
BORG-WARNER
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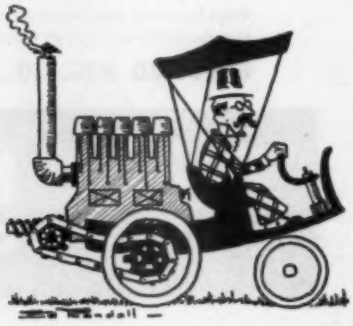
ROCKFORD CLUTCHES



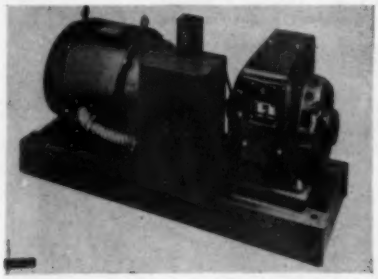
A.E.D. To Hold Joint Regional Meeting at Sun Valley

Active, associated and allied members of the Associated Equipment Distributors from the eleven western states and Canada will hold a joint regional meeting, the first of its kind, at Sun Valley, Idaho, October 12 and 13th. The regions included are Region 11, made up of California, Oregon, Montana and Idaho; Region 14, which is composed of Colorado, Wyoming, Utah, New Mexico, and the vicinity of El Paso, Texas; and Region 15, which includes Canada. Members and their wives will take advantage of Sun Valley's world famous pleasure facilities and engage in several meetings to discuss the problems faced by machinery distributors in a war-time economy. Members from Region 11 should send reservations at once to Associated Equipment Distributors, Sun Valley Regional Conference, Reservation Committee, P.O. Box 1129, Boise, Idaho, also notify Beal Shaw, Director of Region 11, in care of Shaw Sales & Service Co., 5100 Anaheim-Telegraph Road, Los Angeles, who is planning special air and rail transportation.

Although not yet complete, the program already includes some of the finest and most authoritative speakers in the industry. Among them are Charles Weinberg, of Brown-Bevis Equipment Company, Los Angeles, who will speak on "The Survival of Distributors in the Equipment Business"; R. L. Arnold, of Salt Lake City, national president of the Association, who will bring to the conference the latest information on AED activities; and James I. Ballard, vice president of King Publication, San Francisco, who will speak on "Business Behind Your Business." A. F. Sersanous, of Loggers and Contractors Machinery Co., Portland, Oregon, is program chairman, and Phil Dufford of Intermountain Equipment Co., Boise, Idaho, is chairman of the arrangements committee. L. E. Jones, director of Region 12, will act as general chairman of the meeting.

Reservation cards are being mailed to all members. These cards should be filled in by all who plan to attend even though reservations have previously been made, as the information is to be used in the preparation of a pre-convention directory of members in attendance. The executive committee of AED will hold a two-day session at the famed Idaho resort preceding the tri-regional membership meeting.

High Cycle Motor Generator Set



Used to convert 60 cycle current to 180 cycle and 360 cycle frequencies, is this new mono-coil high frequency motor generator set built by Electric Machinery Mfg. Company, Minneapolis, Minnesota. This equipment finds its greatest use in plants using high-cycle automatic electric hand tools such as grinders and buffers. These sets are self exciting and have built-in voltage regulation which automatically compensates for fluctuations in voltage to the load. The compact, easily installed unit shown is 6 kw., 360 cycles, 3600 rpm. Many other ratings and speeds are available.

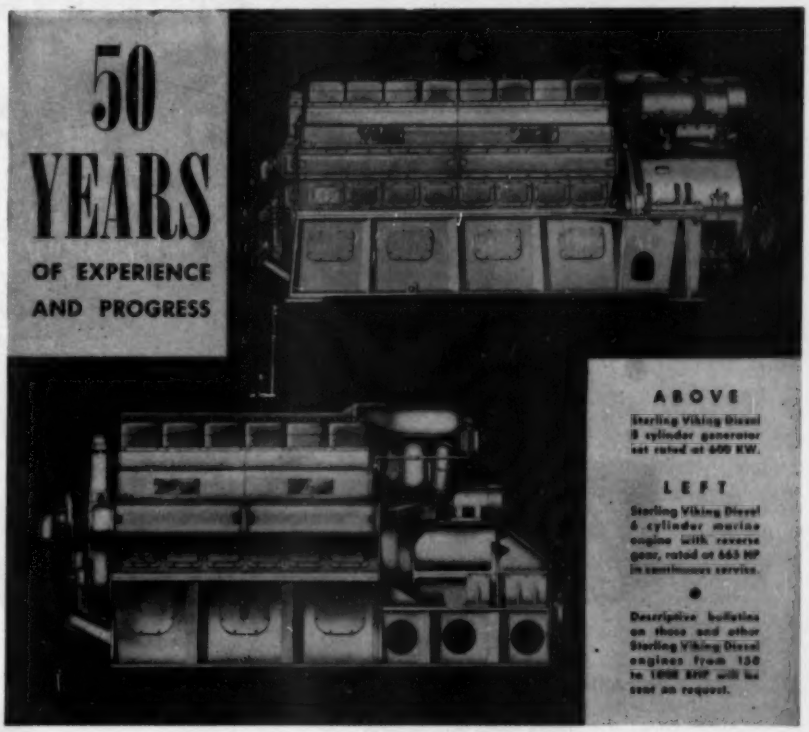
Opens Office at Harrisburg, Pa.

Worthington Pump and Machinery Corporation, Harrison, N. J., has opened a branch office in Harrisburg, Pennsylvania, at 506 Hall Building, Second and Locust Streets, according to an announcement by T. J. Kehane, Worthington general sales manager. The new office will be in charge of A. L. Mays and will be a branch of Worthington's Philadelphia office.

Diesels Out in Front

The Association of American Railroads state that diesel locomotives handled 52% of all gross ton miles in freight service during May, 63% of passenger service. Nineteen Class I railroads now have no steam locomotives at all in service.

DIESEL ENGINE CATALOG has just come off the press in its Sixteenth expanded Edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. ORDER COUPON ON PAGE 25.


50
YEARS
OF EXPERIENCE
AND PROGRESS
ABOVE
Sterling Viking Diesel 8 cylinder generator set rated at 600 KW.
LEFT
Sterling Viking Diesel 6 cylinder marine engine with reverse gear, rated at 665 HP in continuous service.
Descriptive bulletins on these and other Sterling Viking Diesel engines from 150 to 1000 BHP will be sent on request.

POWER to move ships and trains, to operate machinery or to light airports, means much more than merely installing an engine.

Fifty years of experience...broad and successful experience in applying power to just about every conceivable use is one of the reasons why Sterling engines are held in such high regard the world over.

Engineering progress is a second reason for Sterling preference. The best evidence of what constitutes success in engine design and performance is when customers come back for more.

We have the present day orders, facts and figures to show every marine and industrial user of power that Sterling's first 50 years marks just the beginning. *Talk to a Sterling Engineer.*

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MARINE AND INDUSTRIAL

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● Depend upon Sterling Diesel Power for Locomotives, Generator Sets, Commercial and Fishing Craft, Lift Bridges, Ventilating Systems, Drilling Rigs, Etc.

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"Tycol Diesel Oils give smooth performance... assure top engine service"

Absolutely correct! Tycol Diesel Oils are a must for satisfactory lubrication. Their degree of refinement — their service endurance — and their high stability mark them outstanding.

Tycol Diesel Oils have more than proved themselves after years of operation in Diesels of every description and in all types of service . . . from high-speed units for industrial, railway and marine uses where a heavy-duty or detergent oil is necessary to low-speed Diesels where a non-additive lubricant can be used. Yes, sir, there is a Tycol Diesel Oil scientifically engineered for every Diesel application — engineered to do the job better . . . at lower cost.

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how THIN *is a* SHADOW?

Can you picture a millionth of an inch? About the thickness of a shadow would come close to describing it. Yet—parts for American Bosch diesel fuel injection equipment are produced to accuracy tolerances of millionths of an inch every day *on a production basis.*

Such precision manufacture explains the dependability of diesel fuel injection equipment supplied by American Bosch.

Combined with constant development and field engineering and extensive service facilities, it helps explain, too, why American Bosch-equipped diesel engines continue to set new standards of efficiency and economy in ever-widening fields of application.

American Bosch

MAGNETOS • GENERATORS • VOLTAGE REGULATORS • IGNITION COILS
ELECTRIC WINDSHIELD WIPERS • DIESEL FUEL INJECTION EQUIPMENT

AMERICAN BOSCH CORPORATION • SPRINGFIELD 7, MASS.

WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr. Ferguson continues to do independent consulting work.

A NOVEL FORM OF THE HEAT PUMP

THE Royal Festival Hall at the South Bank Exhibition, London, is equipped with a conventional gas boiler heating system, but operating in parallel with this, and intended ultimately to replace it, is a heat pump designed to look after both the cooling in the summer and the heating requirements during the colder months. The plant has been developed by the Ministry of Fuel and Power and is regarded as an experiment though it may well prove to be a successful and permanent adjunct to the Hall. Since the fuel used to develop power to operate the compressors and the pump is town's gas it will be possible to make a direct comparison of the operating costs as against the conventional heating system and thus to assess its true economic value.

The heat to start the process is extracted from cold water pumped from the center of the River Thames by a 50 hp. pump. The maximum flow of water is about 1,800 gallons per minute and it is carried in 12 mains to the plant room where it enters the evaporator system. Freon, the refrigerant, entering the evaporator as a liquid, is boiled away by the heat extracted from the water. The temperature of the Freon vapor is increased by two centrifugal compressors which raise the pressure by about 6 times. The compressors are operated by two Rolls Royce Merlin aircraft engines which have been converted to run on town's gas and each engine gives a power of about 350 hp. The design of the compressors is based on the original Merlin supercharger, and the engines drive them through a gearbox which is also developed from the original gearbox on the aircraft engine. The use of centrifugal compressors for such a purpose is a novel feature in Britain where reciprocating compressors are generally used.

The Freon vapor is compressed by each of the compressors in turn (two-stage compression) and is then cooled in a condenser. It is during this cooling process that the Freon gives up its heat to the water which heats the Hall. Before going into the Concert Hall, the water heated in the condenser by the condensing Freon to about 155° F. is used to cool the two Rolls Royce engines. In cooling the engines, the water receives further heat and finally is led from a waste heat boiler which the exhaust gases from the two engines pass, so that the final temperature of the water is about 165° F. At this temperature the water goes to the Concert Hall, gives up its heat to the atmosphere in the Hall and returns at a temperature of about 140° F. to the condenser where the warming-up cycle starts again.

The Freon vapor, while giving up its heat to the water cools down during the process and regains its liquid state. It passes back to the evaporator where the whole cycle is repeated, starting with the Freon being boiled off by absorbing heat from the river water.

It is expected that the amount of town's gas used to operate the two Rolls Royce engines will be about half that required to provide the Concert Hall with the same amount of heat in conventional boilers. Since roughly 18,000 cubic feet of gas are required to produce 90 therms of heat per hour in conventional boilers, the total saving through using the heat pump should be about 9,000 cubic feet of gas per hour of operation at full output. Besides heating the Concert Hall in winter, the plant provides chilled water for summer cooling, so that separate refrigerating plant for air condition will not be required

The Merlin engines run at a much higher speed (about 2,200 r.p.m.) than is usual for an industrial gas engine, and it will be a matter of interest to see how well they stand up to fairly continuous use at this sort of speed, even though the power is very much below the maximum which they were originally designed to produce. The use of high speed engines and centrifugal compressors leads to a very compact power unit compared with the more conventional slow speed engines and reciprocating compressors.

The construction of the plant has been carried out under the supervision of the Ministry of Fuel and Power by three private firms. Alan Muntz and Co. have been responsible for converting the engines and building the compressors, Matthew Hall & Co. Ltd. carried out all the installation and pipe work, and the U. D. Engineering Co. Ltd., built the large condenser and evaporator plant and also the special refrigerant control valves.

Diesel Plus Gas Turbine

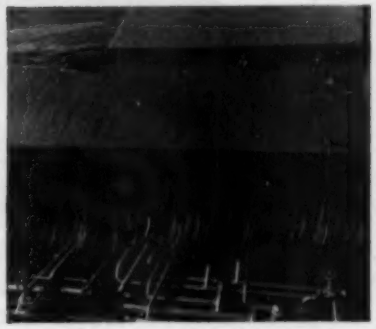
A new airplane power plant combining a diesel piston engine with a gas turbine is ready for flight testing by the designers Napier Aero Engine Company. If these tests prove successful and there is every anticipation they will, the engine has two outstanding advantages—the use of economical diesel fuel plus a low fuel consumption which would allow either bigger payloads or longer flight range for both civil and military planes. So far the experimental units are not sufficiently large enough to equal the power of high speed pure jet planes.

The engine was designed to produce approximately 3000 hp. to turn two contra-rotating propellers, one being turned by the diesel engine, the other by the gas turbine operating off the exhaust gases.

The method of using the exhaust gases is somewhat of a secret. The Society of British Aircraft Constructors which recently disclosed the Napier experiment, said the diesel is a highly supercharged engine and that the turbine does not need the ordinary combustion chambers used to burn gases in normal jet and gas-turbine engines. It is expected that this Napier gas turbine diesel piston engine will be exhibited at the Society of British Aircraft Constructors show to be held at the Farnborough Experimental Station sometime during the month of October.

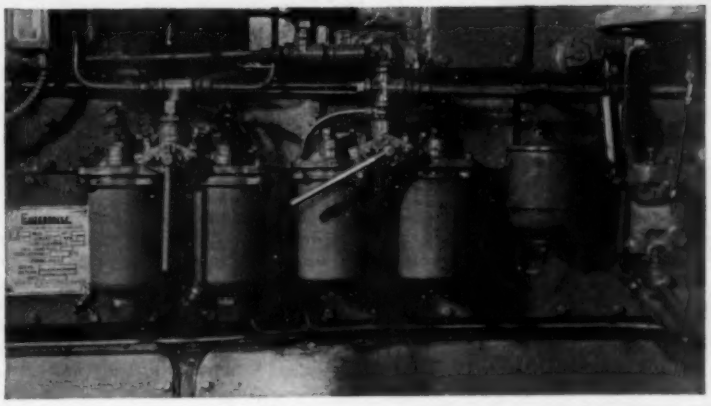
HOT Performance

Hot or cold, Purolator Oil Filters do the job they're designed for. Here at Antelope Station, Union Oil's new pumping plant, 3 Enterprise Diesel engines push upwards of 1000 barrels 16 gravity crude per hour uphill to Avila, Cal., 60 miles west. And they do it "hot."



Engines are conventional 8 in. bore x 10 in. stroke Enterprise Diesels of medium speed (220 h.p. at 720 RPM). Fuel is taken from line, centrifuged, then passed through heater to raise temperature to 180°F.

Hot, free-flowing fuel goes through metalized Purolator strainers on fuel pump which passes it on through tandem Purolator Filters to remove further impurities. Result: smoke-free exhaust—efficient performance at 2500-hour mark.



Antelope installation is another case illustrating the reliance manufacturers and operators place on the Purolator equipment.

A Purolator Micronic* Oil Filter, for example, traps abrasive particles as small as microns (.000039"); *traps more dirt faster*—because its accordion-pleated refill provides filtering area up to 10 times greater than old-style filters. And it won't warp, distort or disintegrate.

For lube oil, a Purolator* assures less wear on hard-working bearings and other vital parts.

For fuel, it provides the complete filtration, so essential for close tolerance injector orifices.

Whatever your filtering problem, let our engineering staff show you how to solve it!

*Reg. U. S. Pat. Off.

Protect your Power with...

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS, INC. • RAHWAY, NEW JERSEY, and TORONTO, ONTARIO, CANADA
FACTORY BRANCH OFFICES: CHICAGO, DETROIT, LOS ANGELES

IS WASTE HEAT WASTING YOUR MONEY?

MAXIM

HEAT RECOVERY SILENCERS CONVERT WASTE EXHAUST HEAT TO USABLE STEAM or HOT WATER

A big Los Angeles Sewage Disposal Plant found that Maxim Heat Recovery Silencers provided all the steam necessary for plant heating as well as heating the sludge — *and from exhaust heat that would otherwise have been wasted.*

Perhaps your own operating expense picture can be improved by this simple and effective way to provide extra steam or hot water for heating or processing operations while at the same time effectively silencing exhaust noise. Our engineering department will be glad to make recommendations.

Automatic Controls

In figure E water is low and there is less effective heating surface (heating surface in contact with water), hence lower steaming rate.

In figure F water is high and gives greater effective heating surface — higher steaming rate. Steam pressure regulated valves control the amount of water to produce desired steam capacity.

Consult **MAXIM**

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Gentlemen: Please send me your Bulletin on Heat Recovery Silencers

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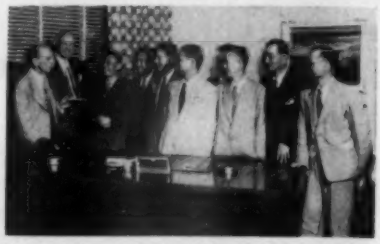
BMXB1

Host to Peace Conference Delegates



B. B. Williams, Board Chairman of The Cooper-Bessemer Corporation, welcomes eight delegates of Japanese Diet (Parliament) during their visit to Mount Vernon, Ohio, to see a "typical small American city." Left to right are: B. B. Williams, Hewitt A. Gehret, Cooper-Bessemer Executive Vice President, Kohei Kimura, Chairman of the Commission, Akisada Okanishi, Takashi Ono, Eizo Kobayashi, Hideo Yamahana, Toyoji Takeshita, Masashi Aoki, and Shozaburo Sugita.

Eight delegates of the Japanese Diet (Parliament) who were later to sit in on the Japanese Peace Conference devoted several days in concentrated research at Mount Vernon, Ohio gathering first hand data on American community life. As part of their study also to obtain an accurate cross section of a typical American industrial plant, the delegates have visited The Cooper-Bessemer Corporation located in this typical American city and a leading builder of gas and diesel engines. As a result of a motion picture produced several years ago by the State Department to portray life in an average American community, these delegates asked specifically to visit Mount Vernon, Ohio and The Cooper-Bessemer Corporation during their stay in this country. Mount Vernon was originally selected to represent the typical small American city for the firm because of its size, the general makeup of its citizens, its industrial and agricultural activities on which its economy depends.

In explaining the operations of this 118 year old company that forms an essential part of this small city, Mr. B. B. Williams, Board Chairman, outlined Cooper-Bessemer's accomplishments in bettering American community life through sound labor-management relations. As a result of such teamwork, he pointed out, the specialized skills developed by this concern now turn out in excess of $48,000,000 each year in vital power generating equipment shipped to every corner of the globe.

Staff Increased in 23 Cities

In further recognition of the increased tempo of the national defense program, Minneapolis-Honeywell Regulator Company has added 35 new sales engineers to 23 strategic defense areas throughout the country. The entire group, it was announced by William H. Steinkamp, field sales manager of the company's Brown Instruments Division, recently completed a comprehensive course in industrial instrument maintenance and repair. Classes were held at the Brown division school in Philadelphia.

CYCLAN

THE NEW PISTON RING MATERIAL FOR TOUGH SERVICE IN HEAVY DUTY DIESEL AND GAS ENGINES

1 *Cyclan* **IS TOUGH,** **WITH PLENTY OF TENSION, BUT NOT BRITTLE**

2 *Cyclan* **HAS TWICE THE BREAKAGE RESISTANCE** **OF ORDINARY IRON**

3 *Cyclan* **RETAINS TENSION** **UP TO 700° F.**

4 *Cyclan* **WITHSTANDS IMPACT, HAMMERING, FLEXING**

5 *Cyclan* **WITHSTANDS** **CONSIDERABLE DISTORTION WITHOUT LOSING SHAPE**

6 *Cyclan* **RESISTS WEAR FAR BETTER** **THAN STANDARD RING IRON**

AVAILABLE FOR RINGS UP TO 9" DIAMETER.

Write for complete information

SEALED POWER CORPORATION
MUSKEGON, MICHIGAN

Sealed Power

PISTON RINGS · PISTONS
CYLINDER SLEEVES

Resumes Production at Kansas City Plant

Three weeks after being inundated by the severe flood that swept the Missouri and Kansas river valleys in July, The Marley Company, Inc. was producing cooling towers and mechanical equipment at its Kansas City plant. Rehabilitation of the plant in the flooded Fairfax industrial district was carried on with such vigor that Marley was first in the area to resume full operation. Marley was fortunate in that water at that point was only eight feet deep and did not reach their executive office and engineering departments. All their drawings, plans, and records were unaffected. Three days after evacuating the Kansas City, Kan., office and plant, several departments were operating in temporary quarters at a local high school. During the emergency period all production and service functions of the Company were assumed by their plants in Louisville, Ky., Stockton, Calif., and Houston, Texas, where stocks of the Kansas City plant are maintained or can be manufactured.

Completes Intermediate and Cargo Vessel

The Chantiers et Ateliers de St. Nazaire Penhoet recently delivered to the Compagnie Fraissinet of Marseilles the passenger and cargo vessel *Foch*, the first of two similar vessels. Propelled by two Burmeister & Wain oil engines of eight cylinders, each developing 4400 hp., the ships will be operated on the French Western Africa service. Four 245 kw. generators supply the electric current (220 volts dc.) and are driven by 4-cylinder Burmeister & Wain engines. The *Foch* has a length of 479 ft. and a moulded breadth of 61 ft. 9 in. and will carry 655 passengers. Service speed will be 16 knots.

New Piston Ring Company

Wm. S. Baker

Wm. S. Baker, designer and manufacturer of industrial piston rings, has announced the establishment earlier this year of a new piston ring manufacturing firm in Fort Worth, Texas. The new firm, headed by Mr. Baker, is known as the Safety Seal Piston Ring Company. Associated in the business are Mr. Baker's two sons, Weldon Baker, as sales manager, and Don Baker, as assistant sales manager. Offices of the company are located at 2800 West Lancaster, in Forth Worth. Prior to setting up his own organization, Wm. S. Baker served as chief engineer with the Double Seal Ring Co. Both Weldon and Don Baker have had many years experience in the manufacture and application of industrial piston rings. The organization specializes in the manufacture of the "Safety Seal" piston ring which, Mr. Baker claims, has been especially developed to handle present day requirements of higher compression and firing pressures. The organization offers an engineering service to customers.

Additive Eliminates Clogging of Filter Screens

A new fuel additive which virtually eliminates filter screen clogging is now being marketed by Shell Chemical Corporation, it was announced by L. V. Steck, vice president. In diesels, it is claimed, Ionad 17 (the additive) will reduce maintenance costs due to clogged streams and fouled fuel injector parts. Initial tests by the company indicated that clogging of fuel oil screens may very well become a thing of the past. The idea, however, of incorporating an additive into fuel oil was so revolutionary that marketing of Ionad 17 was suspended until its effectiveness could be demonstrated in exhaustive field tests. Such tests by the manufacturer have proven to their satisfaction that Ionad 17 is stable, non-corrosive and easy to use. Along with its non-clogging feature, it reduces the severity of treatment usually required by the refiner and also prevents the accumulation of tank sludge.

horn! It [illegible] the answers to su[illegible]

In Dan'l Boone's day [illegible] had to keep his powder dry, just as Diesel owners have to keep lin[illegible] crankshafts in good working order.

But even with these critical items as hard to get as a fresh supply of gunpowder in the wilderness, Diesel users needn't worry. They NO LONGER need to REPLACE such worn out parts.

Even those checked off as scrap are brought back better-than-new with Vanderloy M and PORUS-KROME*—and for less than the price of replacements.

Parts restored in this way have the same longer-wearing life and higher efficiency that makes returns always greater than the cost of processing original equipment with PORUS-KROME.

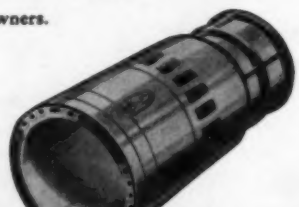
That's a standard practice now with many Diesel owners.

And they've eliminated all over-size stocks — because glass-smooth, diamond-hard PORUS-KROME can easily be restored again when efficient working limits finally are reached.

It's the one sure way to *"keep your powder dry."*

★ ★ ★

**PORUS-KROME is a dense, hard, wear and corrosion-resistant chromium, produced by the Van der Horst Corporation of America, and which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication.*



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U. S. PATENTS 1,048,578, 2,314,604 and 2,412,698

PORUS - KROME VAN DER HORST

Two Purolator Transfers

Frederick P. Babcock has been appointed permanent Washington representative for Purolator Products, Inc., Rahway, N. J., manufacturers of oil filters and other filtration equipment. He headquarters at 927—15 Street, N.W., Washington 5, D. C. Formerly assistant sales manager in charge of aviation, export, and government equipment sales, Mr. Babcock joined Purolator in 1937 after technical work with Stanavo division of Standard Oil of New Jersey at Bayonne, Bayway and Jersey City, and sales managership of the New Brunswick, N. J. bulk plant.

Stephen W. Bumball, also has transferred to Purolator's equipment sales department and appointed sales engineer to handle details of the aviation, export and government trade. As payroll supervisor, he also joined Purolator in 1937 and subsequently has served with the company as auditor and credit manager.

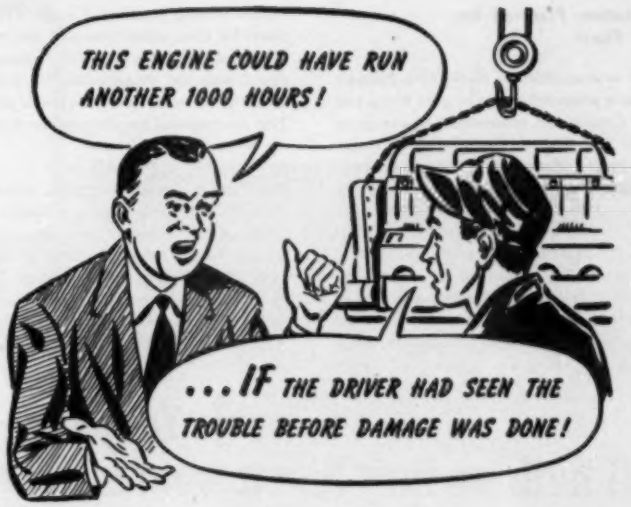
Cummins Sales and Service in Georgia

The sales and service of Cummins diesels for the State of Georgia are now being handled by Cummins Diesel of Georgia, Inc., at 1207 Howell Mill Road, N.W. Atlanta, Georgia. David Black, former assistant secretary of the Trust Company of Georgia, at Atlanta, is president of the new corporation. L. W. Beck, vice-president—sales, Cummins Engine Company, Inc., has announced that facilities at the new service location in Atlanta include a 9,000 square foot building with adequate parking space. The shop has equipment for complete engine overhaul and rebuilding. One of the special tools newly installed for this purpose is an engine dynamometer. A complete stock of Cummins-warranted parts are also available.

Booklet Issued

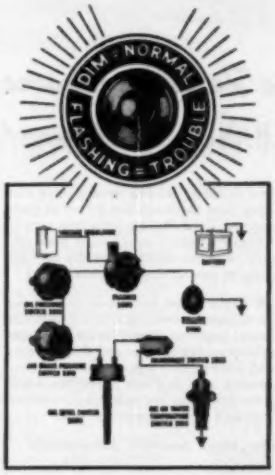
Interesting highlights on "Caterpillar" high speed earthmovers, the new Caterpillar DW20 Tractor with its W20 Wagon and No. 20 Scraper and the Caterpillar DW21 Tractor and No. 21 Scraper, are presented in a 24-page booklet entitled "Caterpillar Diesel DW-20-DW21 Tractors." Highly illustrated, the booklet features the new six-cylinder supercharged DW-20 and DW21 diesel engine. It points out the fuel injection system developed by Caterpillar and includes design and performance data on the 225 hp. engine. Additional information is presented in specifications of the DW20 and DW21, the No. 20S Bulldozer, the No. 27 Cable Control, the W20 Wagon, and No. 20 and No. 21 Scrapers. Copies of this booklet may be secured by requesting Form 30160 from Caterpillar Tractor Co., Peoria 8, Ill., or by contacting your Caterpillar dealer.

DIESEL ENGINE CATALOG has just come off the press in its Sixteenth expanded Edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. ORDER COUPON ON PAGE 25.



TELLITE flashes a clear bright signal whenever failure occurs in

OIL PRESSURE — GENERATOR OUTPUT
OIL TEMPERATURE — WATER TEMPERATURE



A pilot light glows dimly when conditions are normal . . . flashes brilliantly the instant trouble begins — before costly damage is done.

TELLITE is low in cost and economical to install. Write today for full details. Rochester Manufacturing Co., Inc., 101 Rockwood St., Rochester 10, New York.

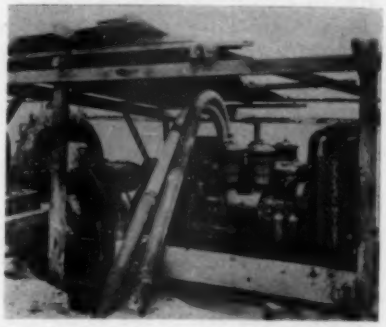
ROCHESTER
MANUFACTURING COMPANY, INC.
DIAL THERMOMETERS GAUGES AMMETERS
ROCHESTER DEPENDABLE ACCURACY GAUGES

Modernization Planned for Oil City Plant

A $500,000 modernization of its Oil City, Pennsylvania, plant is planned by Worthington Pump and Machinery Corporation, according to an announcement by Mr. L. C. Ricketts, vice president in charge of manufacturing. Plans include re-equipping the present foundry and establishing a new electric power supply, he said. The plant has retained Sorbo-Mat Process Engineers, foundry specialists of St. Louis, to make foundry layouts and develop a method of making castings which is known as "innoculation." This method produces irons of predetermined physical and chemical properties and produces products that have superior machining and wearing in service. To supply the increased power for these installations and also to guarantee uninterrupted service of power, a contract has been signed with the Pennsylvania Electric Company for the purchase of all electric power requirements. This contemplates the discontinuance of the existing generating equipment.

The contract provides for electric power to be supplied at 22,000 volts and installation of a transformer station to reduce the voltage to 4160 volts for distribution to plant substations. Motor generators sets will be used to generate DC current which, together with the AC distribution described, will supply suitable current to motors and machine tools and to feed the lighting circuits. New lighting fixtures will provide adequate light throughout the plant. While Worthington's Oil City Plant is being used for the miscellaneous overflow from its other factories, production of some products is being transferred to this plant for total manufacture.

Giant De-Watering Project



Pumping day and night on the Antioch, California, de-watering project is a giant Byron-Jackson pump driven by a GM Twin-6 diesel. Engines are stopped only for oil and filter changes.

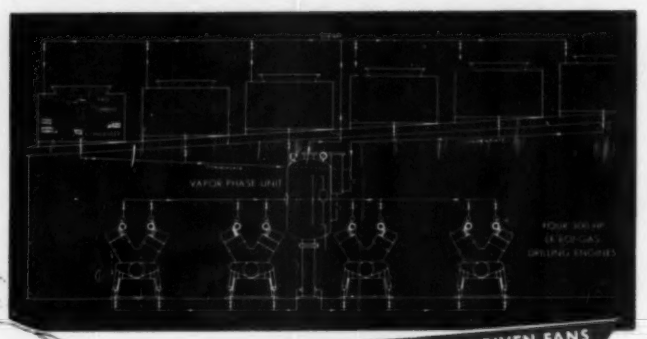
A night and day pumping operation to remove 12 to 14 feet of water from a large section of land in California which has a multi-million dollar crop potential for 1952 has been going on since May 15, 1951 at the rate of about 175,000 gallons per minute. The area involves 5,500 acres of extremely fertile delta land between the Sacramento and San Joaquin Rivers near Antioch, which was flooded last winter when river waters broke through a protective levee. The levee was repaired this spring and now the land owners are racing against time to get the acreage pumped, dried and leveled in time for next year's planting. The water is being pumped back over the levee by five 36-inch discharge pumps, each of which delivers about 35,000 gallons per minute. Contractor on the job is the Hild Electric and Manufacturing Company of Stockton, who called upon Moore Equipment Company, Inc., also of Stockton, to provide diesel power for one of the Byron-Jackson pumps, supplementing the work of four similar electrically-powered pumps. A General Motors "Twin-6" diesel engine was installed on the giant pump and has been running continuously since the project started with time off only for oil and filter changes. It is estimated that the job will be completed successfully early this fall.

Diesel Operators Conference

A diesel engine operators conference will be held on the campus of The Oklahoma A. & M. College October 22, 23, 24 and 25, 1951. The object of the conference is directed primarily toward the operators of large low and medium speed diesels and dual-fuel engines. Information to be covered includes maintenance and servicing of lubricating systems, fuel systems, electrical equipment, blowers and superchargers and governors. There will also be information on high temperature coolant operation and plant safety. Attendance is not limited. All are invited to attend. Registration may be made through Professor M. L. Powers, Engineering Extension Division, Oklahoma A & M College, Stillwater, Oklahoma. Registration fee is $10.00.

boiling radiator
"Hell hath no fury like a ~~woman scorned~~"

drilling crews know...



NO RADIATORS • NO BELT DRIVEN FANS

VAPOR PHASE with Steam Turbine Fan Condensers Solves ENGINE COOLING and LOAD CHANGE Problems!

At best, oil well drilling is rugged! When radiators boil and power fails, "there's hell to pay!"

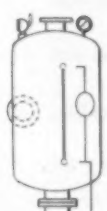
Engines that power drilling rigs are not to blame. It's the antiquated cooling system that steals power and fails to deliver under severe load and load-change demands.

For a year now, Vapor Phase has corrected these costly conditions for a major West Coast oil company. Instead of boiling radiators and frequent power failure, *trouble-free* Vapor Phase, with steam driven fans, now supplies constant uniform cooling under *all* conditions of load and ambient temperatures.

When drilling, driving mud pumps and pulling pipe to change bits, power to spare is assured. Load-change problems vanish. All engines remain at constant peak efficiency, whether idling, partially or fully loaded, or part of them overloaded.

With Vapor Phase, *waste heat* (not engine power) controls cooling, keeps it uniform. Precious make-up water, formerly wasted and blown over engines and floor, is now saved. Destructive engine condensation corrosion, sludging and hazardous working environment are eliminated -- breakdowns and repairs, rare!

Vapor Phase functions automatically...



VAPOR PHASE *also serves vital power needs in* PIPELINE PUMPING STATIONS, GASOLINE PLANTS, REFINERIES, ENGINE GENERATING PLANTS, *etc.*

AND ALL IT COSTS IS FUEL FOR THE ENGINES!

Sizes available for any individual or group of Diesel, Gasoline or Gas engines.

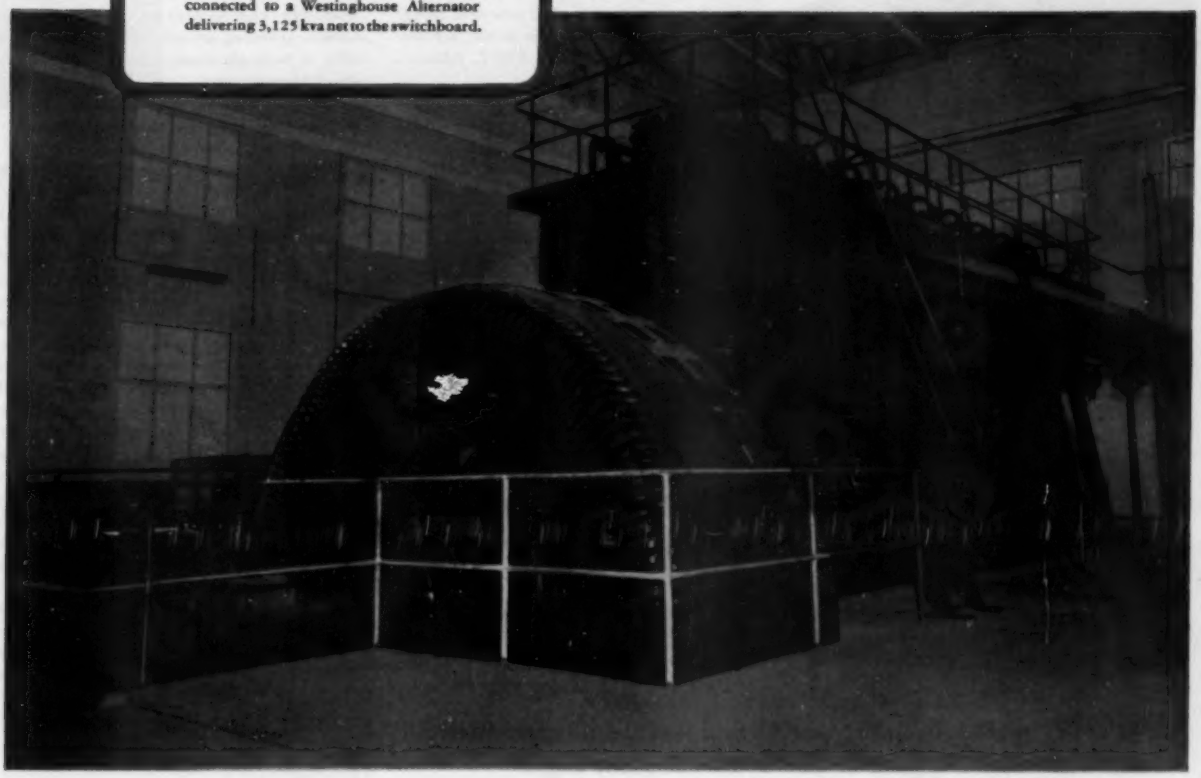
VAPOR PHASE pays off in Savings alone, the first year. The unit costs nothing to operate and is good for life.

WRITE OR WIRE FOR INFORMATION

Offices in Most Principal Cities

ENGINEERING CONTROLS, Inc.
2835 East Eleventh St., Los Angeles 23

This is the first American-made engine generator unit installed at the power plant of the Bermuda Electric Light Co., Ltd. The Nordberg Diesel Engine is direct-connected to a Westinghouse Alternator delivering 3,125 kva net to the switchboard.



This generator unit turned the tide at Bermuda

Here is the first American generator unit installed at the Bermuda Electric Light Co., Ltd. Prior to 1939, all the generating units were of British make. This unit changed the pattern . . . consisted of a Westinghouse Generator and a Nordberg Diesel Engine. The outstanding performance of this unit was responsible for another similar installation in 1950.

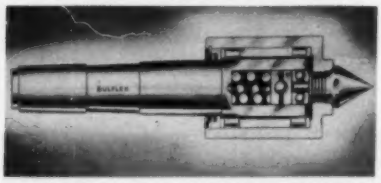
Westinghouse Generators create such acceptance because of their reliability—long life—performance. Once you specify Westinghouse you'll always specify Westinghouse. Take the fabricated steel rotor . . . it has been designed with such a high factor of safety that it is practically unbreakable. The all-steel frame makes possible a stator assembly having maximum strength and the permanent tightness of core that is necessary for a quiet, smooth-running machine. Electrical efficiency is tops, too . . . materials are so proportioned that the maximum efficiency of conversion is obtained from three-quarters to full load.

Call your Westinghouse Power Apparatus Specialist for complete consultation on your generator installations. He will work with you on the design, selection and application of the right equipment. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-10362

Westinghouse

A-C GENERATORS

Precision Accuracy in Finish Grinding

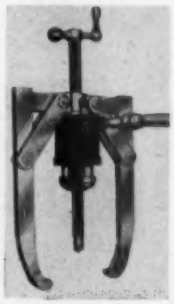


Designed for precision accuracy in finish grinding, the Bulflex live center, it is claimed, can perform many grinding operations without dogs by simply utilizing the friction force developed by the spring-loaded head. The tool can be shifted back and forth between heavy lathe work and precision cylindrical grinding with perfect performance in either operation. The guaranteed accuracy is .0003-inch total runout. Ultra precision, .0000—.0001-inch total runout, is available at extra cost. The manufacturer states that the useful life of the tool is unknown since all the units which have been made during the past three years are still in operation and many of those checked have been found to show no perceptible wear. The Bulflex is made by The Bultool Sales Company, 9101 E. Jefferson Avenue, Detroit 14, Mich.

Going, Going . . .

Steam locomotives will soon be a thing of the past on the Erie Railroad thus making it one of the first fully dieselized trunk line railroads in the East. With the recent approval for the purchase of 13 additional diesel units at an estimated $1,900,000, the Erie will have spent over $60 million in the past seven years for dieselization. It would take approximately $9 million more to completely dieselize the road. In its entire territory from New York to Chicago, it has steam locomotives operating on only three divisions. Over 94% of its freight business is now handled with diesel locomotives.

Pullers Adapted to Hydraulic Power

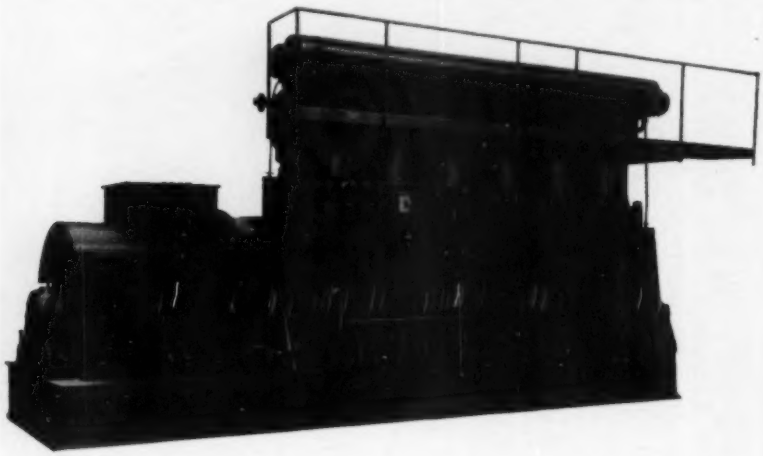


Three of the most popular sizes of the OTC Grip-O-Matic Pullers can now be used with the new OTC Power-Twin Hydraulic Puller. Only slight changes are necessary to change over OTC Pullers No. 1003L, 1003½ and 1003½-L to fast-operating hydraulic power to make them even more effective and efficient and to increase their range of utility. The versatile Power-Twin puller speeds up the work, eliminates torque and takes the hard work out of all pulling jobs. It's safer, too, because of the remote control feature. The Power-Twin ram can easily and quickly be detached from the Grip-O-Matic puller and used just as effectively on OTC Push-Pullers or on a bench or pedestal press. Present OTC pullers can be converted with only a few additional parts. For complete information about hydraulic pullers contact your nearest OTC jobber or write to the Owatonna Tool Company, 415 Cedar Street, Owatonna, Minesota.

Manages New Quincy Post

Harold Stone

Harold Stone has been appointed manager of the St. Louis office and sales territory for Quincy Compressor Company. Mr. Stone was transferred from the company's New York office. Before holding that position he was a member of the staff at the office and factory of the organization in Quincy, Illinois.

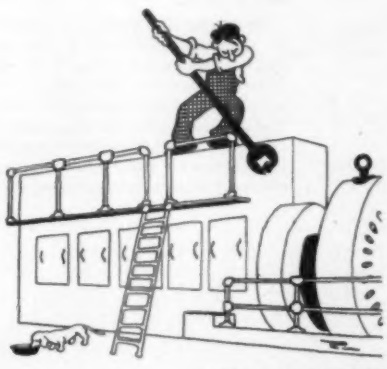


UNION, in 1885, built the world's first successful liquid-fueled internal combustion engine • The UNION airplane engine was the first to meet endurance requirements of the United States Aeronautics Testing Laboratory • A UNION was the first American-manufactured, exhaust-gas, supercharged, heavy-duty Diesel engine • UNION Dual Fuel Engines are used where simplicity, dependability and economy are paramount • Two UNION engines and an assembly which illustrate outstanding developments are on exhibit at the Smithsonian Institution in Washington, D. C.

Only UNION has been manufacturing quality internal combustion engines for more than 66 years

UNION DIESEL

2121 DIESEL STREET, OAKLAND 6, CALIFORNIA, U.S.A.



Booklet on Governor Problems

"How to Get the Most Out of Your Governor" is answered in the latest issue of "Control," a complete, up-to-date presentation of (centrifugal) governor problems and applications, published by The Pierce Governor Company. Illustrated with photographs and schematic drawings, the new booklet describes operation of Pierce governing mechaniums—explains, with the use of easy-to-read charts, governor weight energies and calibrations. The booklet includes important discussions on valve boxes, valve shafts and linkages; positioning of governor levers and geometry of connections; causes and effects of engine condition on governor efficiency. Complete details on governor adjustment, care and maintenance, along with a description of basic type Pierce governors and their uses, are also included in the new booklet. For your free copy of "Control," write The Pierce Governor Company, Inc., Anderson, Indiana.

Shipped to Liberian Iron Ore Mines

The huge "Fluid Coolers" are the first of four units designed and fabricated by The Trane Company, La Crosse, Wis., to air-cool jacket water and lube oil under tropical temperatures for the GM diesel power plants of Liberia Mining Co., Ltd., Monrovia, Liberia, West Africa. Each unit's 102-inch propeller fan will blow 80,000 cubic feet of air per minute across six rows of extended surface heat exchanger cores to cool 300 gallons of water and 150 gallons of lubricating oil per minute. The Trane Company, manufacturer of air conditioning, heating, ventilating and heat transfer equipment is fabricating similar units of various sizes for U. S. Navy radio installations overseas, and for the giant Gulf Coast aluminum reduction plants of the Aluminum Company of America and Kaiser Aluminum & Chemical Corporation.

Named Production Control Manager

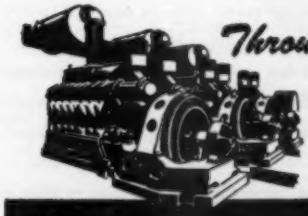
Richard P. Carroll has been named production control manager for Hunt-Spiller Manufacturing Corporation, Boston, Massachusetts, producer of diesel engine parts. He will remain in charge of cost and material controls.

ASK THE AEROFIN MAN

For the Practical Answer to Your Heat-Exchange Problem...

There is a competent Aerofin heat-transfer engineer near you, qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem.

This specialized knowledge is there, ready for you to use to your greatest advantage. Ask the Aerofin man — and be right.



Throughout the Power Industry—

Aerofin units do the job Better, Faster, Cheaper

AEROFIN CORPORATION

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

Book on Fuel Oil Published

Those who buy, use or sell fuel oil for heat-treating, building heating, power generation or marine applications, will find much of value in "Fuel Oil Manual" by Paul F. Schmidt, chief chemist, Allied Oil Co., Inc., Cleveland, Ohio. The author has been associated 15 years with this company, which markets in excess of 500 million gallons of fuel oil annually, and he is in charge of testing all oils received and in blending oils for specific specifications. The book is the result of years of experience in trouble shooting. Technical language is used as little as possible, and theory and involved discussions of interest only to chemists or refiners are avoided. All terms are fully explained. Covered in this book are complete data on the properties of fuel oil, the possibilities and limitations of each grade of oil, methods which can be used to assure uniform quality and efficient combustion, how to diagnose fuel oil troubles and how to remedy them, and particularly important, how to get maximum value from each fuel oil dollar. Under Troubles and Remedies are listed 22 of the common fuel oil troubles, their symptoms, and the remedy to follow in each case.

The text, which includes 34 tables, is divided into 24 chapters covering chemistry of petroleum, petroleum refining processes, grades and types of fuel oils, gravity, heat of combustion, viscosity, water and sediment, carbon, ash and salt residue, flash and fire points, pour point, sulfur, color, distillation, preheating of oils, sampling storage tanks, stability of fuel oils, fuel oil treatments, reclaimed fuel oils, blending of oils, transportation and storage, fuel oil specifications, and complaints and causes of troubles. Fuel Oil Manual, by P. F. Schmidt. Fabrikoid bound, 6 x 9 inches, 160 pages. Published by The Industrial Press, 148 Lafayette St., New York 13, N. Y. Price, $3.50. Canadian or overseas postage 40c.

Vice Presidents Elected

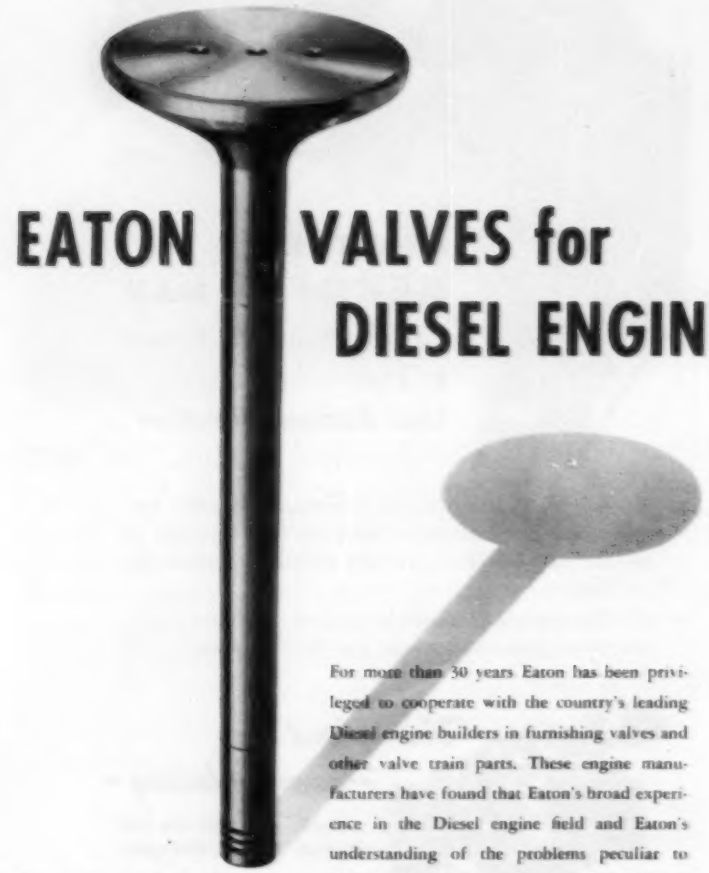
Benjamin A. Main, Jr. H. L. Schrock

Peter F. Hurst, president of Aeroquip Corporation, Jackson, Michigan, recently announced the election, by the Board of Directors, of two new vice-presidents of the Company. Benjamin A. Main, Jr., Vice President in Charge of Engineering, has been with Aeroquip since 1942 as Chief Development Engineer. A graduate of special courses at the University of Michigan. Mr. Main is a member of the Society of Automotive Engineers and the Society's committee A-3 aircraft valves, fittings and flexible hose assemblies. H. L. Schrock, Jr., Vice President and Treasurer, has been with the Company since 1947. A graduate of Northwestern University, he was formerly with Ernst & Ernst, certified public accountants, except for nineteen months spent in the USAP during World War II.

DEMA Announces One-Day Educational Conferences For The Fall

The Diesel Engine Manufacturers Association has announced the following one-day educational conferences for this coming fall: in Buffalo, N.Y.—October 9th, at Worthington Pump and Machinery Corporation; in Cleveland, Ohio—October 16th, at Aluminum Company of America; in Chicago, Ill.—October 30th, DEMA breakfast for those professors attending the diesel sessions of the Society of Automotive Engineers; in Denver, Colorado—November 3rd, at University of Denver; in Oakland, California—November 6th, at Winslow Engineering Company; in Philadelphia, Pa.—November 8th, at Wilkening Manufacturing Company; in Los Angeles, California—November 8th, at Farr Company, Inc.; in Meriden, Conn.—November 13th, at Cuno Engineering Corporation.

Professors who teach courses in the diesel engine field will be invited to attend this series of conferences that have been set up across the country from New England to the Pacific Coast. The program will be a combination of plant tours and discussions on selected technical subjects, with the object in mind of giving these educators who attend material that will aid them in doing a better job of teaching.



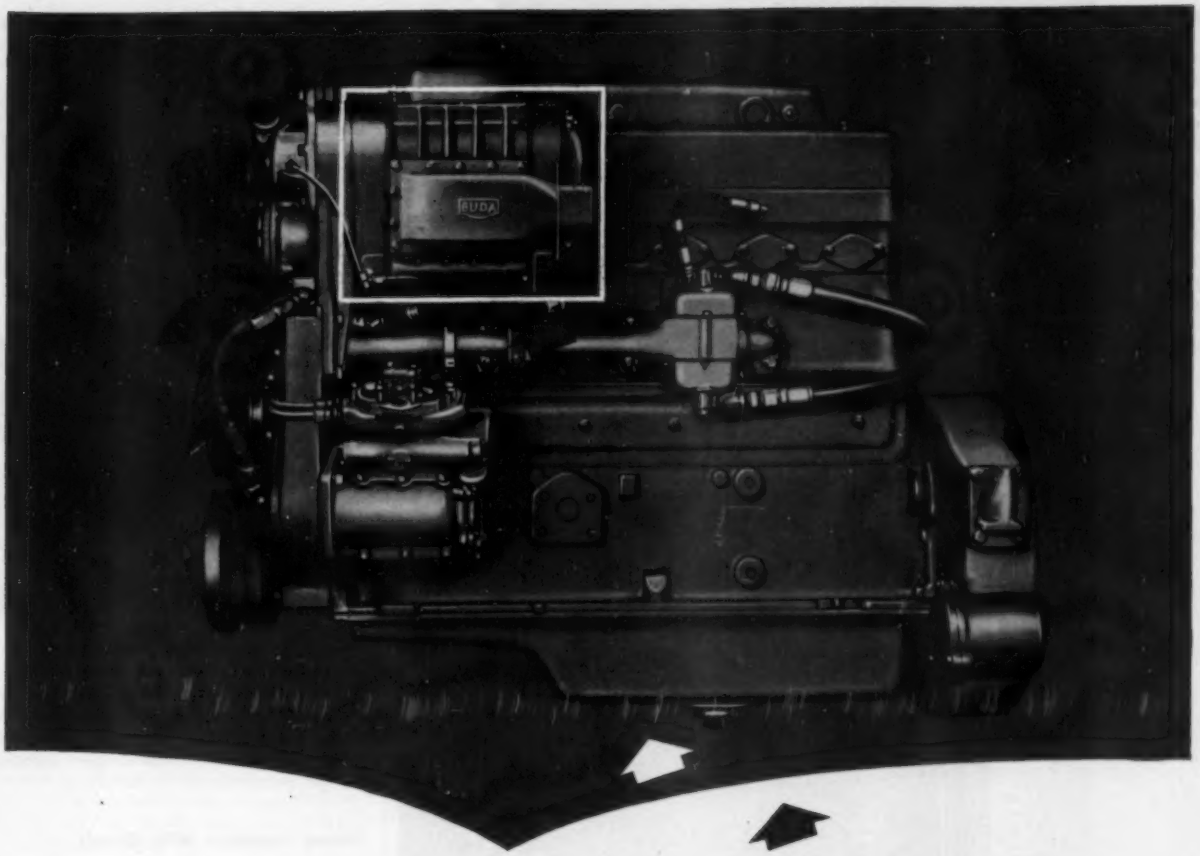
EATON VALVES for DIESEL ENGINES

Eaton engineers will welcome the opportunity to discuss the application of Eaton valves to engines now in design or in production.

For more than 30 years Eaton has been privileged to cooperate with the country's leading Diesel engine builders in furnishing valves and other valve train parts. These engine manufacturers have found that Eaton's broad experience in the Diesel engine field and Eaton's understanding of the problems peculiar to Diesel engineering, are as valuable to them as the quality of the valves produced.

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO
VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves · Tappets · Hydraulic Valve Lifters · Valve Seat Inserts · Jet Engine Parts · Rotor Pumps · Motor Truck Axles · Permanent Mold Gray Iron Castings · Heater-Defroster Units · Snap Rings Springlites · Spring Washers · Cold Drawn Steel · Stampings · Leaf and Coil Springs · Dynamatic Drives, Brakes, Dynamometers



BUILT-IN POWER

BUDA Diesels use B-W Superchargers built in for added horsepower and economy

The Buda Company of Harvey, Illinois, uses B-W Superchargers on their diesels. This recently released automotive diesel engine, Model 6-DTS-468, develops 150 brake horsepower at 2,400 r.p.m. Designed for heavy-duty truck operation both at sea level and altitude. The supercharger on this engine is one of a standard line developed by Pesco Products Division.

For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means power to pull heavy loads . . . means sea level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

The engine manufacturer who wants to pack more power into a given engine size . . . or who wants to add an entire new series of models to his line without retooling or the expense of redesign, can do so simply by equipping his present line with B-W Superchargers. One of our engineers will gladly explain how this can be done. There is no obligation. Write today to:

engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD BEDFORD, OHIO

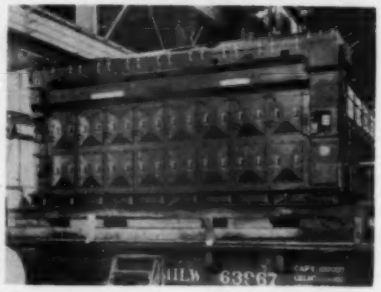
N.Y. Central Expands Dieselization

The New York Central Railroad has expanded the dieselization of its St. Lawrence Division by inauguration of "Beeliner" rail diesel car service between Syracuse and Massena, N. Y. A new air-conditioned, streamlined, diesel-driven car will replace trains No. 10 and 9, both now pulled by steam locomotives. The Beeliner will make the 161-mile run from Massena to Syracuse as Train No. 10 in the morning and will return as No. 9 in the afternoon. The fast acceleration and smooth, powerful braking power of the new diesel car will permit an improvement over present schedules according to the road. The New York Central has seven similar Beeliners in service; four on its Boston & Albany line in both local and through service, two between Harmon and Peekskill, N. Y., in local service, and one between Detroit and Midland, Michigan.

Marine Distributor Named

Appointment of Nap J. Hudon, 40 Fish Pier, Boston, Massachusetts, as marine distributor for Nordberg 4FS diesel engines in Boston and Gloucester, Massachusetts areas has been announced by Nordberg Manufacturing Company, Milwaukee 7, Wisconsin. Mr. Hudon established his organization in 1945 and has been at his present location on Fish Pier for a year. With complete machine shop facilities on Fish Pier, the firm is well equipped to repair and rebuild almost any type of diesel engine. Mr. Raymond Ralston is service manager and Olney Anthony, foreman over the crew of 15 servicemen, is in charge of all major overhauls. In charge of the rigging department is Omer Pineault, a veteran of eight years with the Charleston Navy yard. In addition to Hudon's complete line of Nordberg 4FS engines and parts, the firm is also a distributor for Ingersoll Rand air-starting motors. Mr. Hudon is in charge of sales and has two salesmen covering his territory.

Town Installs More Diesels



Two of these supercharged 1440 hp. Superior diesels are destined for the municipal power plant in Newton Falls, Ohio. Consulting engineers for the project are Carl J. Simon & Associates, Van Wert, Ohio; a firm having wide experience in municipal diesel plant operation. The new engines are being installed to meet the system-load increase.

Power Insurance With Diesels

Regardless of what King Winter may have in store for Cleveland, Ohio, in the months to come, St. Luke's Hospital is not going to relive another period of virtual paralysis such as it experienced in the fall of 1950 when its elevator system was crippled by one of the worst snow storms ever recorded in the area. The storm was such that automobiles were stranded in the streets for days. Factories were closed and business was practically halted. The hospital's problem of transporting emergency patients up and down dark and winding stairways to operating and treatment rooms was one of serious consequences.

To safeguard the operation of its elevators in the event of future emergency, hospital officials decided to install a 100 kw. standby generator which is driven by a 6-cylinder GM diesel engine. Because of the safety factor of diesel fuel, it was not necessary to make any expensive excavation for diesel storage tanks. The complete unit including fuel tanks was installed in a small space in the hospital's basement. In addition to operating the elevators, sufficient emergency power is available to keep stokers working and this safeguards facilities for sterilizing, heating, cooking and laundering. Another unit provides for emergency lighting.

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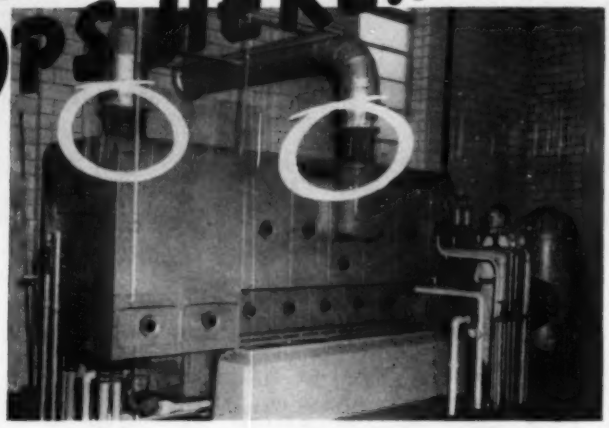
VIBRATION STOPS HERE...



...when you use CMH REX-WELD Flexible Metal Exhaust Connectors

CMH REX-WELD Flexible Exhaust Connectors are available in sizes from 1" to 24", I.D. Furnished with standard pipe nipples, couplings, fixed or floating flanges. Other types available for such services as fuel, oil, air, and lube lines.

It's easy and economical to keep engine vibration out of rigid exhaust or air intake lines with CMH Flexible Metal Exhaust Connectors. Fabricated from heavy duty corrugated tubing, they not only isolate vibration but absorb expansion and contraction and correct for misalignment as well. Because they are all-metal assemblies, they are leak-tight and require no maintenance. Engineered corrugation design gives the fatigue resistance necessary for long, dependable service. Write today for data sheets.

In the illustration above CMH REX-WELD Connectors, Type RW-75, are used in the exhaust and air intake lines of this Fairbanks-Morse Diesel, one of three installed in the municipal pumping station at Corpus Christi, Texas.

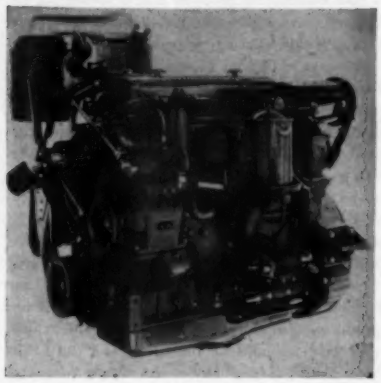
Flexon identifies CMH products that have served industry for over 49 years

CHICAGO METAL HOSE Corporation

1325 S. Third Avenue • Maywood, Illinois • Plants at Maywood, Elgin and Rock Falls, Ill.
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

CMH ONE DEPENDABLE SOURCE for every flexible metal hose requirement

Redesigned GM Diesels Power Truck



The GMC Truck and Coach Division has announced that the 4-71 and 6-71 GM diesels which incorporate the new design changes (see page 87, this issue DIESEL PROGRESS) will be applied on GMC 650, 740, 750, 900, 950 and 970 series trucks and tractors. The design of the engines which allows for metal to metal contact between head and block plus the Fuel Modulator and a camshaft which keeps valves open through a greater portion of the shaft revolution is said to increase power, give greater economy and make for longer life. None of the changes in the engine will obsolete former GMC diesels since the new components were designed to be interchangeable with the old. Horsepower in the four-cylinder (4-71) has been boosted from 133 bhp. to 150 bhp. The six-cylinder (6-71) engine has had 25 extra horsepower built into it, now being 225 bhp. Despite the increase in horsepower, a higher fuel economy has been effected. The Fuel Modulator which is incorporated into the new governor assembly, is an automatic control that feeds the right amount of fuel and air for maximum efficiency regardless of throttle position.

Allis-Chalmers Elects Five New Officers, Advances Three

The election of five new officers and advancement of three other officers of Allis-Chalmers Manufacturing Company has been announced by W. A. Roberts, president of the firm. Four new vice presidents were elected. W. G. Scholl, general sales manager of the tractor division, was named vice president in charge of sales for the tractor division and C. W. Schweers, director of sales in the general machinery division, was named vice president in charge of sales for the general machinery division. J. F. Roberts, director of engineering in the general machinery division, was named vice president in charge of engineering for the general machinery division, and W. A. Yost, manager of the mechanical power department, was named a vice president in the general machinery division. G. F. Langenohl, assistant treasurer, was elected to the position of treasurer and appointed assistant secretary. N. D. Johnson, assistant secretary, will continue to serve in that capacity and assume additional responsibilities as assistant treasurer. Two new assitant comptrollers named were E. J. Dietrich, assistant to the comptroller, and T. D. Lyons, works comptroller.

Hoffman I-718-18 cartridge filters provide continuous filtration of lube oil for this and other diesel engines on the Mid-Valley Pipeline. Cover-lifting device and swing-bolts speed removal of head for replacement of "throw-away" cellulose cartridges.

Lube Oil Clarity for Pump Station Diesels of Mid-Valley Pipe Line Protected by HOFFMAN Filters

Reclamation of lube oil to "like-new" standards is accomplished by Mid-Valley stations with Hoffman Model I-18-10 Vaporizers. Soluble impurities (such as light ends and water) are removed continuously by thermostatically controlled heating of the oil under high vacuum.

For the gas-diesel and straight diesel engines of Mid-Valley's pumping stations, nine Hoffman cartridge filters and three Hoffman vaporizers maintain lubricating oil with these advantages: The cartridge filters, directly connected to the engines and standby oil pumps, provide continuous purification of the lubricating oil.

Hoffman's exclusive cover lifting device and simplified swing-bolt assembly speed replacement of 7" x 18" cartridges. As an adjunct, the Hoffman Vaporizer removes solubles, at high flow rates, without the high maintenance cost of centrifuges. Write for technical bulletin.

FREE Filtration Engineering Service

For the right answer to your filtering problems, a Hoffman filtration engineer will survey your needs — make recommendations based on detailed analysis of solutions, oils and other factors. Ask for this service — there is no obligation.

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FILTRATION DIVISION

UNITED STATES HOFFMAN MACHINERY CORPORATION

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CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

Worthington Names Manager

V. de P. Gerbereux

Mr. V. de P. Gerbereux has been appointed manager of the Centrifugal Pump Sales Division of Worthington Pump and Machinery Corporation, according to an announcement by W. H. Feldmann, vice president in charge of sales. He succeeds Mr. A. H. Borchardt who was recently elected vice president in charge of centrifugal, reciprocating and vertical turbine pump sales. Mr. Gerbereux was graduated from Cornell University with a mechanical engineering degree in 1924 and the same year took the Worthington Student Training Course. He became successively a centrifugal pump designer, an application engineer and in 1937 assistant manager of the Centrifugal Pump Sales Division. Inventor of a specific speed slide rule and an acid valve, he is also well known as the author of the centrifugal pump section of Kents Handbook.

Diesels Reclaim "Wasteland"

While some strip mining concerns have been called "spoilers of the nation's farmlands," the Little Sister Coal Corporation, owner of twelve square miles of coal-bearing property in Fulton County, Illinois, is attracting national interest with a land reclamation program that is converting its badlands into a veritable breadbasket. Spoil piles that protrude like ugly grayish-brown warts from 4,550 acres of Central Illinois land are being bulldozed level by diesel-powered crawler tractors in a nonstop operation. After the spoil piles are toppled into gaping canyons that scar the landscape, the land is treated with commercial nitrogen before being seeded with grain and forage crops. Anxious to reclaim the land that is still being up-ended at the rate of .65 of an acre per day by power shovels with 40-cubic-yard buckets, mine owner William H. Cooke, Chicago, retained the Farm Clinic of the United States, West Lafayette, Indiana, to make surveys and analyze the soil for productive properties. Early in 1950 favorable findings were reported by the Clinic and the Little Sister Farms, a subsidiary of the mining company, was set up with Francis J. Platt as manager.

A level area of some size begins to take shap as the big International crawler "irons out" the landscape. Areas to be worked are in background.

Playing a role in this reclamation program is an International TD-24 tractor that has operated on a three-shift basis since being put to work on November 1, 1950. The irregular topography of the land makes it impossible to calculate exact yardage moved, but the TD-24 is credited by Mr. Platt with recovering an acre of farmland each day. Mr. Platt's records show that earth moving has been completed on 550 of the 4,550 acres labeled for reclamation in the period ending June 1, 1951, and that 300 of the reclaimed acres are now planted in rye, oats, alfalfa, and wheat. The land, according to the manager of the Little Sister Farms, is now in some cases more productive and easier to farm than before it was ripped up by the power shovels. The land is easier to work because in some areas it is flatter after being bulldozed than it was in its native state. The land is now more productive, after receiving commercial fertilizer as indicated by the Farm Clinic, because the stripping and dozing operations mix many crop-stimulating minerals throughout the soil, minerals that originally were out of reach of the plant roots. While it will take many years for the present equipment to rehabilitate the recoverable acreage on the Little Sister Farms, the first crops will be harvested this season, and next spring more acres of previously "worthless" land will be put under cultivation.

DIESEL ENGINE CATALOG has just come off the press in its Sixteenth expanded Edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. ORDER COUPON ON PAGE 25.

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interchangeable parts—lower maintenance costs
Even the heaviest parts of every FULTON DIESEL are craftsman-machined to such close tolerances that they are completely interchangeable. Result:
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Obsolete parts and items no longer stocked by the engine builder need not keep your power plant equipment out of service.

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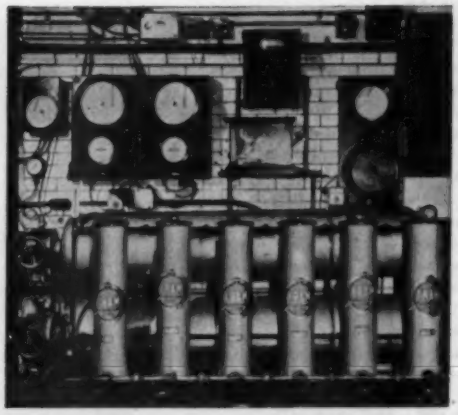

These six Fram Filters serve 840 h. p. Fried Krupp Diesel at large eastern university. This Diesel drives a 600 kw. Crocker-Wheeler generator.

University Cuts Maintenance Costs of Diesel Power Plant with FRAM Filters

Four Fram Filter installations filter dirt, grime, sludge and carbon from lubricating oil of 545 h.p., 630 h.p., 840 h.p. Fried Krupps and a 448 h.p. Baldwin in power house of large eastern university. Engineers consider Fram Filters the best . . . definitely a money-saver. Absolutely no maintenance except changing cartridges.

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No matter what your Diesel oil filtering problem—either fuel or lube—Fram can help you conquer it. Write for full information today to FRAM CORPORATION, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

FRAM *Filcron*

THE MODERN OIL FILTER

INJECTION EQUIPMENT REBUILDING

By SIDNEY HOFFMAN

SHORTAGES of materials combined with rising costs have given the parts rebuilding industry a tremendous impetus. Old parts are made to do where not so long ago they would have been unhesitatingly replaced with new ones. We got curious as to the effectiveness and dependability of these rebuilt parts and how they were being accepted. We knew that poorly rebuilt parts had soured many a diesel operator on them and that only high standard rebuilding could account for any increase in their use. We decided to go down and take a look at one of the several finer operations in the servicing of fuel injectors and pumps.

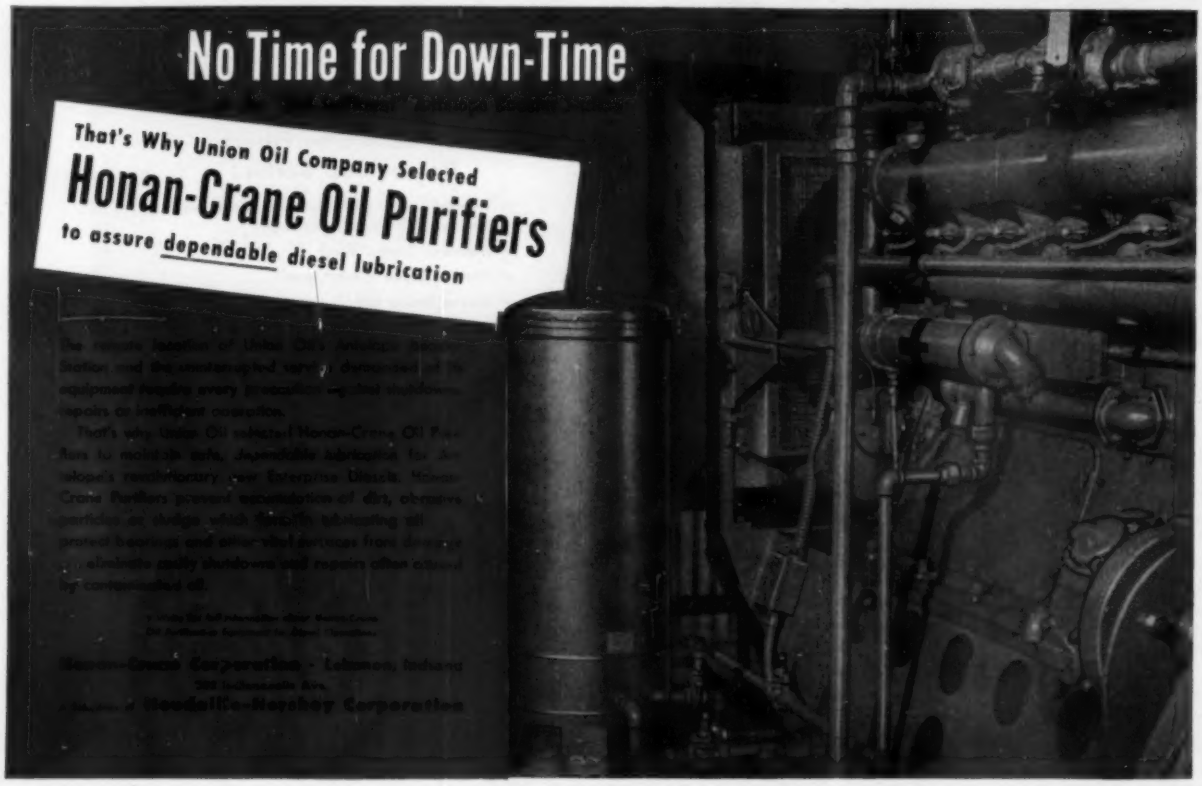
Established somewhat over three years ago, the Diesel Injection Equipment Company of Los Angeles, owned and operated by Robert T. Stewart and Frank D. Hedger, specializes exclusively in the rebuilding of fuel injectors and pumps. Mentioning the generally suspicious attitude toward rebuilt parts, we asked Mr. Hedger to what he attributed the growing success of their operation. "The work is done on a quality basis," he replied, "and we give fast service. We know that when a part is needed it is usually needed fast or a lot of valuable equipment becomes non-producing overhead. We will ship parts on receipt of an order and bill later when the exchange item is received. In this way days may be saved and equipment kept operating with a minimum of down time."

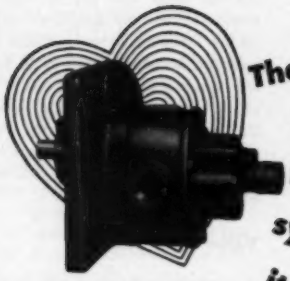
One of Diesel Injection Equipment Company's injector laboratories.

While going through the plant, our eye caught a large shipment being readied for the U. S. Navy at Port Hueneme where a massive amount of construction equipment is in the process of being "de-mothballed." "Not only do we supply the U. S. Navy," said Mr. Hedger, "but orders are coming in from other government agencies in addition to our regular customers. A quality job has paid off for us," he continued, "we don't consider a job finished when it comes off the bench. Every part is oiled to prevent rusting, carefully wrapped, securely boxed and labeled." We paused to watch one of the machinists testing a rebuilt Cummins injector under 2500 pounds pressure. The barrel had been straightened and a new plunger fitted into it. He was carefully measuring and timing the leakage. "No equipment leaves our shop unless it meets the highest possible standards. We have to guarantee dependability."

This organization's re-working of injection equipment even included the re-bluing of parts originally blued, such as GMC injectors, to return them to a "like new" appearance. Mr. Stewart pointed out another feature of the labs which is an added insurance against damage of parts during the rebuilding process. The floors are entirely of rubber tile. A part accidentally dropped merely bounces without any damage to threads.

It was gratifying to see for ourselves that the rebuilding industry is answering a real need in this time of critical shortages. When re-built parts maintain the high standards which diesel users have come to expect from their suppliers, this branch of the industry will receive more and more acceptance. This fact was evidenced by the labels on the cases of injectors and pumps waiting to be shipped.


No Time for Down-Time
That's Why Union Oil Company Selected
Honan-Crane Oil Purifiers
to assure dependable diesel lubrication



The HEART of a diesel lubricating system is its PUMP

Rotary geared pump with special flange mounting becomes integral part of diesel engine when installed. Note opening above relief valve for tachometer.

Modern diesel operation generally requires a pressure lubricating system — and the vital element is the pump. Thousands of Brown & Sharpe pumps are now providing reliable service month after month without interruption, for lubrication, transfer, or booster systems. Available with various types of flange mountings and special internal construction to meet specific requirements. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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DIESEL ENGINE CATALOG

The purpose of this little advertisement is to tell you about Volume 16 of DIESEL ENGINE CATALOG which is now available, entirely revised and rewritten. This is the 16th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him *all* data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Advance orders are now being accepted for the limited edition. Price $10.00 prepaid.

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Coal Stockpile Fires Stopped

Officials at the Continental Motors Corporation, Market Street plant at Muskegon, Michigan, are no longer plagued by fires started by spontaneous combustion in the plant's 70,000 ton coal stockpile. The pile is now being compacted and sealed simultaneously with an International TD-14A crawler equipped with scraper and dozer which loads and hauls the coal to the 8500 kw. power plant. Under the old system, coal was moved from the stockpile into gondola cars by a crane with a three yard bucket and then hauled approximately 580 feet to the power plant. This old equipment could move only 40 tons of coal hourly as compared with the 78 tons now being moved by the crawler and scraper with a 8.5 cubic yard capacity.

Since the crane was not designed to compact and seal the loose coal in the stockpile, oxidation caused fires that had to be extinguished by the local fire department. An operator always had to be hired with tractor and dozer to work with the fire fighters to locate the smoldering fire. Ever since the new crawler and scraper have been on the job, not one single coal pile fire has been reported and checks show the equipment is helping maintain the low, sought-after temperatures throughout the stockpile. An added benefit is the fact that the new International haul unit delivers a full week's supply of coal, 2,755 tons, to the power plant in just 22½ working hours, leaving the crawler and dozer free to work two days each week on grading and compacting company parking lots and on the plant dump area.

Valve Seat Insert

A valve seat insert which it is claimed is free from fracturing, checking, burning, fatigue, flaking and spalling is being marketed by Martin Wells, 5886 Compton Avenue, Los Angeles 1, California. This Well-Tite valve seat insert, designed for internal combustion engines, is an alloy of six elements which includes nickel, chrome and tungsten. The alloy is of medium hardness and due to its density and elasticity is pliable to the extent that neither heat nor shock will cause checks or fractures of any kind. Because of the high nickel content, this valve seat has the ability to dissipate heat trapped around the valve, particularly the exhaust valves. These cooling properties keep the valve cool and greatly extends its life. It is further claimed that high acid, or so-called "sour" gases will not pit or corrode the inserts.

Completes New Building

C. F. Reeves

The De Laval Steam Turbine Company of Trenton, New Jersey has announced the completion of a new building at 160 Folsom Street, San Francisco, California. This building will be De Laval's new San Francisco headquarters for sales and service activities. Besides providing increased warehousing facilities for standard centrifugal pumps, IMO pumps, speed reducers and flexible couplings it will also permit much faster handling of repair and service for De Laval's western customers. This expanded activity will be under the direction of Mr. C. F. Reeves, who has long been in charge of De Laval's West Coast sales.

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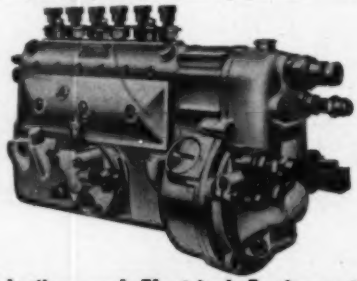

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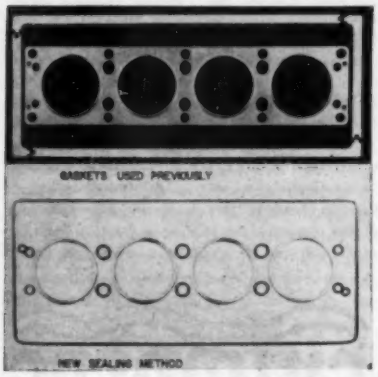
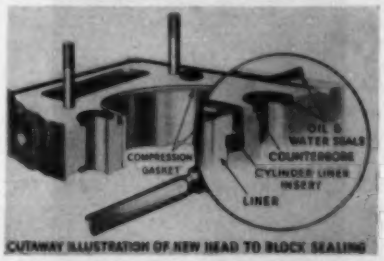
DESIGN CHANGES IN GM DIESELS

THE Detroit Diesel Engine Division of General Motors has announced several new design changes in production models of their three, four and six-cylinder Series 71 GM Diesel engines; changes calculated to prolong engine life and further reduce upkeep requirements. Chief among these newly designed features is a revolutionary method of sealing oil, water and compression between the cylinder block and head which does away with the laminated gasket commonly used in internal combustion engines. The most difficult task of cylinder head-to-block gasketing is compression sealing. Oil and water passages must also be perfectly sealed, of course, to prevent the dilution of crankcase oil. Detroit Diesel, through the adoption of individual seals designed to place primary emphasis upon compression sealing and secondary but sufficient emphasis on sealing the oil and water passages, has accomplished both.



The compression gaskets, in the form of laminated Terne Plate rings, take the major pressure of the head-to-block stud bolts. These gaskets are thereby compressed from an original thickness of .085 to .100 inches to .057 to .061 inches when the stud nuts are pulled down to the recommended wrench torque. A small "skirt" on each compression gasket ring fits into a recess between the cylinder liner and the cylinder bore in the block, assuring correct positioning over the cylinder liner. When the head is pulled down to recommended torque on the stud nuts, a positive metal-to-metal contact is assured between the lower surface of the head (known as the "fire desk"), the compression gaskets and the cylinder liners. Immediately adjacent to the compression gaskets, however, there are clearances between the head and block of from .007 to .014 inches. This assures positive contact on the compression gaskets and positive compression sealing. Sealing of oil and water passages is accomplished by compressing individual, synthetic rubber seals (one for each water and oil passage) around the holes and between the cylinder head and block. Around each such drilled water or oil passage a recess of liberal diameter is counterbored into the block. Typical water-holes, for example, are counterbored .116 to .120 inches deep and the washer-like seal, with a nominal thickness of .157 inches, is placed in the counter-bore. When the cylinder head is drawn down the seals are compressed to a maximum of .039 inches.

Installation of these seals is simply a matter of dropping the proper size seal in the counterbores. Resembling flat hose washers, these circular seals come in only two sizes, sufficiently different to be immediately recognizable. A long, endless seal of approximately the same cross-section as the "washer" type seals fits in a rectangularly-milled groove approximately ⅞ inches in from the outside perimeter of the block.



CUTAWAY ILLUSTRATION OF NEW HEAD TO BLOCK SEALING

The new Series 71 engine blocks are manufactured 1/16 inch higher to make up for the difference between the old laminated gasket and the new sealing system. The compression ratio is not affected. Both the head and the block have been materially strengthened. Additional internal ribs were added to the head; existing ribs and struts in the block were "beefed up." Stud holes for the cylinder head studs are drilled and tapped ½ inch deeper in the blocks to accommodate longer hold-down studs with longer threaded contact. The deeper holes also allow a stress-relieving counter-bore in the block to better distribute the stud load. A second new feature in the Series 71 engine design is a special chilled-and-tempered cast-iron ring which now forms a replaceable seat for the cylinder liner upper flange. One of these is dropped into the counter-bore of each cylinder before the cylinder liner is inserted.

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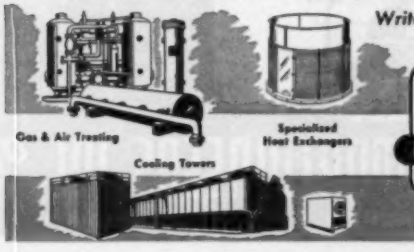

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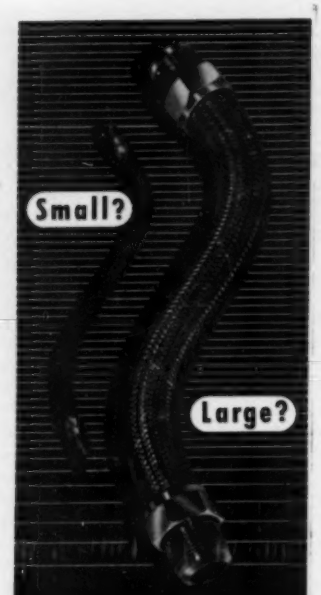

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Regardless of how you use tubing, there's a size and a type of Titeflex that will do your job. Titeflex is made in diameters from 3/16" to 3", to solve all problems of size. It's made in plain steel, stainless, brass, bronze, monel and inconel to handle all kinds of corrosive gases and liquids. And it's made in types to take temperatures up to 1650° F. and pressures up to 6800 lbs.

Titeflex is constructed entirely of metal, with no packing to wear out. It has *both* flexibility and strength. That's why it does *more* jobs and *lasts longer* doing them.

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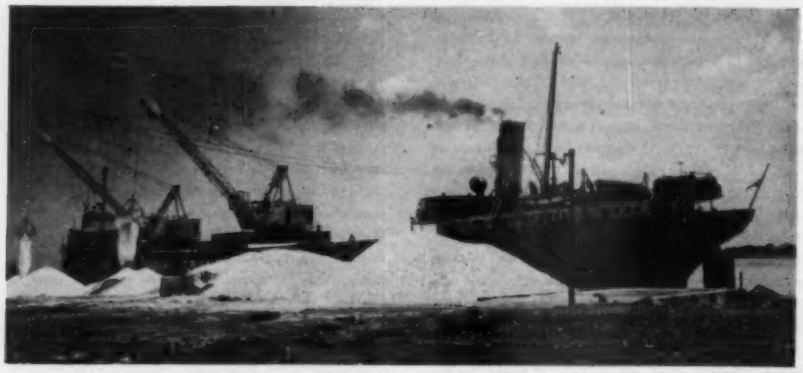

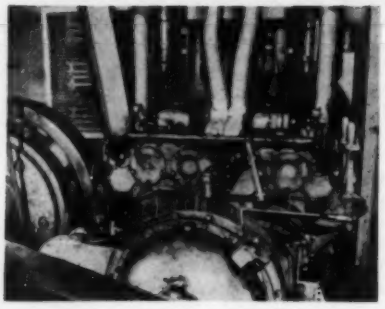

View in the crane cab showing the GM Twin-4 diesels with General Motors torque converter. One of these units powers the three drum hoist in each crane. Ship's boilers drop to "standby" in port.

The *W. C. Richardson* unloads part of her 7000 ton cargo of sulphur at a Detroit chemical plant. Four thousand tons were unloaded and the ship underway again in 11 hours.

DIESELIZED travelling cranes installed aboard the *W. C. Richardson*, one of Columbia Transportation Company's older cargo carriers has made this ship one of the most useful and flexible in the Company's Great Lakes fleet. According to Captain Henry F. Wiersch, Marine Superintendent of the company, the loading and unloading time of the ship has been reduced two to three hours;

Get rid of the SHUDDERS

Shudders characteristic of twin and multiple screw boats can be greatly reduced by Synchro-Master which automatically controls the relative speeds (revs.) of all engines. Give us a chance to prove this, by writing for data and recommendations. Address inquiries to %Proportioneers, Inc.%, Synchro-Master Division, P. O. Box 1442, Providence 1, R. I.

SYNCHRO-MASTER

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SYNCHRO-MASTER DIVISION

operating costs have dropped and due to the quick starting of the engines the cranes are always instantly available for use. In addition, it is no longer necessary to keep up a full head of steam while loading or unloading in port and better working conditions for crew and dock handlers have resulted. Another important advantage reported is the elimination of damage to cargo holds. This often amounted to as much as $35,000 per year and was caused by pitching seven-ton magnets from stationary cranes into the far corners of the holds. The travelling cranes now permit vertical access to the holds at any point on the ship.

The *W. C. Richardson* has a keel length of 420-ft., a beam of 52-ft. and a depth of 28-ft. She was originally built in 1908 but was reconstructed in 1950 with bulkheads relocated to make four holds for diversified cargoes. She carries sulphur, pig and scrap iron, structural steel and coal and makes stops at all Great Lakes ports. The loading and unloading equipment, installed at the same time, consists of two 45-ton American Hoist and Derrick travelling and revolving cranes equipped with 75-ft. booms. Each crane has a three drum hoist and each is powered by a General Motors Twin-4 diesel engine operating through a General Motors Torque Converter. The swing of each crane is accomplished by a 30 hp. electric motor capable of revolving the crane at two complete revolutions per minute. Power for travel up and down the deck is furnished by four 15 hp. electric motors mounted on four two-wheeled trucks with all eight wheels driving. The electric motors in each crane are powered by a 6-cylinder General Motors diesel engine direct connected to an Allis-Chalmers 100 kw., 300-volt generator. Both the hoisting engines and the generator sets are carried in the crane cabs.

Each crane has available for use a 77-inch Cutler-Hammer magnet activated by the diesel-powered generator, a 4-yard Owen clam shell, bridle chains and slings. Due to the compact size of the diesel engines ample room is available in the crane cabs to permit an orderly arrangement of the machinery and to afford easy access to it for service and maintenance. The instant throttle response of the engines and the cushioning effect of the torque converters make the power delivered as flexible as steam for lifting. The torque converters also protect both engine and attached machinery from the shock of sudden starts and load variations. They also prevent stalling of the engines under overload conditions.

The freighter was observed recently while unloading sulphur at a chemical plant on the Detroit River. A load of 4,000 tons was discharged with all clean-up operations completed and the ship underway again in 11 hours. Captain Angus MacDonald, Master of the *W. C. Richardson*, took characteristic pride in his ship when he said: "There isn't a craft in the world that can load or unload varied cargoes as fast and efficiently as the *W. C. Richardson*. By saving time in ports we make we make more trips per season—and that's especially important these days when increased tonnage is so vital to industry."

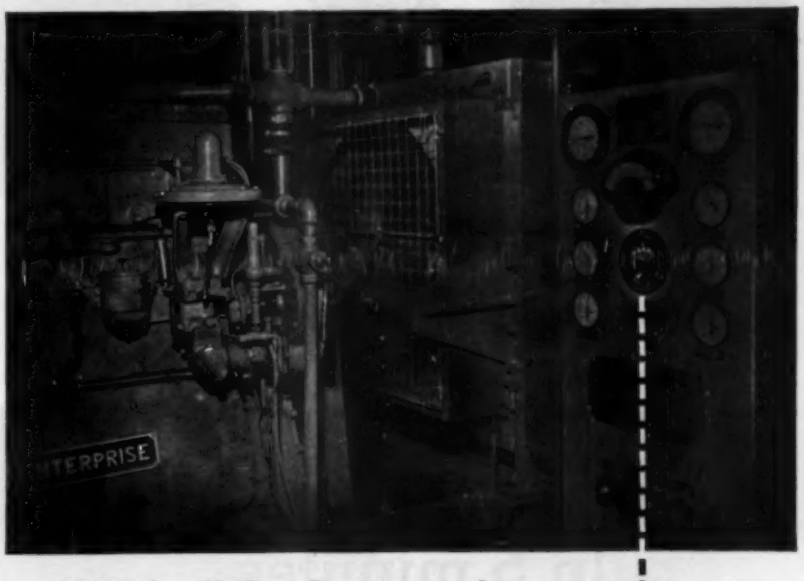
DIESEL ENGINE CATALOG has just come off the press in its Sixteenth expanded Edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. ORDER COUPON ON PAGE 25.

Bearings For Tank Engines

Federal-Mogul is preparing to undertake the manufacture of silver bearings, important in tank engines, for the nation's defense program, the corporation revealed. During World War II, Federal-Mogul turned out large quantities of silver bearings for aircraft engines. According to the announcement, the comuany is placing orders for a half million dollars worth of special machinery and equipment for the manufacture of silver bearings. Floor space will be made available at the Detroit plant by rearranging existing machinery. The bearings to be made for the present program are principally for large tank engines but also for certain other types of military power plants.

New Twelve-Page Catalog

Announcement has been made by Roland Lehr, sales manager, Quincy Compressor Company, of a new twelve-page catalog, Form 300, featuring the Quincy line of air compressors specifically designed for industrial service. This catalog, handsomely designed in two colors, presents a complete study, by means of illustrations, drawings and specifications of the 35 air-cooled Quincy Compressors generally recommended for industrial use. Copies of this catalog will be furnished upon request to the company. Quincy Compressor Company is located at Quincy, Illinois, with branch offices in New York, Philadelphia, Chicago, St. Louis, Dallas and San Francisco.



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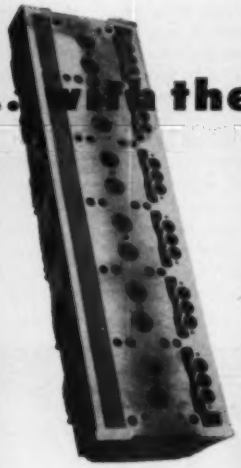

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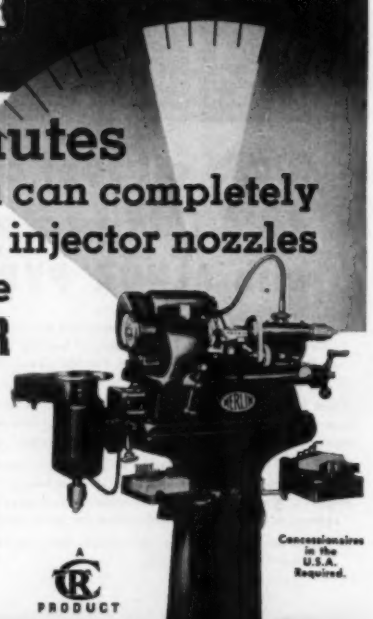

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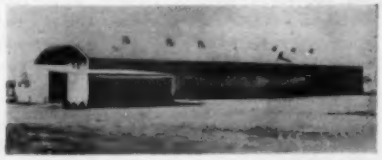
New Version of Temperature Regulator

A new modern version of a proven type of temperature regulator has been placed on the market by The Powers Regulator Company of Skokie, Illinois. It is an expansion stem type regulator used to maintain liquids or air at any temperature desired by controlling pneumatic or water operated diaphragm valves for dampers. The equipment, known as the Powers Accritem Temperature Regulator, can be applied on instantaneous water heaters, heat exchangers, large capacity water storage heaters, jacket water for air compressors, diesel and gas engines, etc. Simple, rugged construction withstands vibration and assures long dependable service. It features adjustable sensitivity and overheat protection and calibrated dial temperature adjustment. Temperature ranges are 50° to 250° F. and 150° to 350° F. Easy to install at the point where temperature is to be controlled, it requires compressed air or water at 15 pounds pressure. The small size regulator head is 2⅞ inches by 3⅛ inches. The sensitive bulb is 12 inches long with ½ inch I.P.S. connection. The sensitive element consists of an Invar rod enclosed by a silver soldered copper bulb. Bulb wells of corrosion resistant metals are available.

Phoenix Distributor Enlarges Facilities



Keeping pace with the growing Southwestern region around Phoenix, Arizona, Cummins & Moran recently occupied the modern 12,500 square foot building shown above, located at 1350 North 22nd Avenue, Phoenix. Cummins & Moran are Cummins Dealers for Arizona, New Mexico, the three most western counties of Texas, the two southeastern counties in Nevada. The new headquarters building of the dealership is situated near the major truck route to Los Angeles and in the heart of Phoenix's industrial area.

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Diesel Engine Bulletin

A new comprehensive bulletin describing its type FV diesel engine has been announced by the Cooper-Bessemer Corporation, Mount Vernon, Ohio. Built in six, eight, twelve and sixteen cylinder types, the Cooper-Bessemer FV engines are currently used for locomotive service, draglines and electric power generation in industrial plants both in this country and abroad. The bulletin, giving complete engineering data, specifications and power ratings, is available by writing The Cooper-Bessemer Corporation, Mount Vernon, Ohio. Ask for Bulletin FV-63.

Have You Forgotten?

Just a gentle reminder that Volume Sixteen of the DISEL ENGINE CATALOG is now ready for the mails. In fact, several thousand copies have already reached the field and are being profitably used by the men who bought them. We don't have to tell you about this book. You have purchased previous editions. You know how useful it is, how vitally necesary it is when you need quick, accurate information on any given make and size of diesel engine. It has been properly named "The Bible of a Great Industry."

To date, the petroleum industry alone has bought 512 copies—gas pipe line people in particular are buying this book this year. Diesel service shops have bought 474 copies of Volume Sixteen to date —a mightly useful tool for them. Naval architects and shipyards have bought 246 copies—the marine end of the business is definitely picking up. Over 1000 copies have gone out to diesel salesmen and service personnel—they must have the latest copy. An old edition is of no use to them—models and ratings change too quickly.

Why not order your copy today. You need it. Your old copy is out of date. Volume Sixteen will bring you right up to date. Send your check for $10.00 (plus 35c sales tax for delivery in Los Angeles, 30c for delivery in California) to DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, California. If you wish, you can send us your company purchase order and we will bill you.

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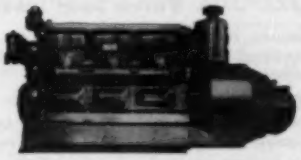

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Inland River Reports

By DAVID I. DAY

WE OBSERVED the *Joan E* of the Texas Towing Co., moored at the Knoxville, Tenn., wharf recently. This is one the extreme upper reaches of the navigable Tennessee River, now lined with locks and dams and often called "The Great Lakes of the South." This is a new boat, launched in June at the Avondale yards near New Orleans. This 2500-hp. pusher has twin Enterprise engines. We were told that Capt. C. H. Stringer had brought the boat all the way from Harvey, La., 1800 miles upstream all the way, in eight days, six hours. The tow was 42,000 barrels of gasoline.

THANKS TO Joe Wentworth for kodak pictures showing the *Frances K* at work recently laying a pipeline across the Mississippi above Baton Rouge. This little 49-ft. boat is a fine worker. She has two Caterpillar engines totaling 330 hp. Capt. L. Muirhead is currently in charge.

THE "GREEN BOAT"—the *Frank B. Durant*, is now busily engaged in the oil trade on the upper Ohio. Aboard recently were some fine old-time packet boatmen like Capt. Clarence W. Elder and Capt. Fred Way, Jr., master and pilot respectively. Seen headed upstream she was a fine sight back of four barges of crude oil and four barges of gasoline. The *Durant* was built at the Alexander shipyards last year and is powered by General Motors diesels, 2400 hp.

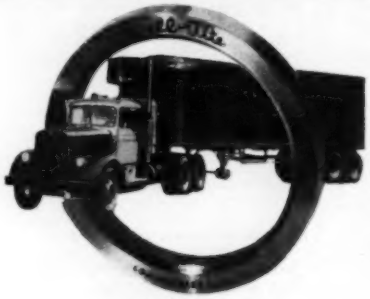
AND TWIN Caterpillars totaling 1200 hp., propel the new *Bull Durham* recently completed for the Bull Towing Co., St. Louis, Mo., by the Nashville Bridge Co., Nashville, Tenn. The boat is 86 x 26 x 9 feet approximately and is pushing petroleum products on the Mississippi and Illinois rivers.

WE FAILED to recognize the M.V. *W. V. Keeley* of the Pure Oil fleet when we saw her pushing empties on the upper Ohio. However, she is the same boat as was once called *Husky No. 1* and busy for the Upper Mississippi Towing Co., Minneapolis, Minn. At the present time, Capt. Lee Wiatt is in command. The boat has National Superior engines totaling about 700 hp.

NO NEATER towboat is in the sand and gravel trade on the Ohio than the *J. W. Bedford* of the Bedford-Nugent Company, Evansville, Ind. It retired the old steamer *Sanco* and has easily demonstrated the extra economy and efficiency of diesel power. She is 116 x 27 x 8½ and has two Enterprise diesels with a total of 900 hp. Waukesha diesels furnish auxiliary power.

THE BIG *New Orleans* of the Mississippi Valley Barge Line has been a very active diesel vessel all year. She is powered by General Motors twin diesels developing at least 3200 hp. One of the most impressive river pictures show her passing Memphis with a huge tow of various commodities. The *New Orleans* is built out of the *Herbert Hoover*, long a great river vessel which had McIntosh & Seymour diesels.

THE ROAD TO LONGEST VALVE LIFE



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PIERCE replacement governors to fit most engines are available through your local distributor.

For your distributor's name or for specific information on new engine design or special governing problems, write or call Sales Department, Pierce Governor, 1603 Ohio Ave., Box 1,000, Anderson, Indiana.

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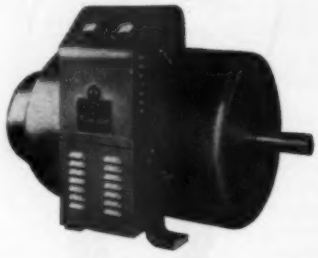

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E-M SPECIALISTS IN GENERATOR ENGINEERING

AN INTERESTING sight on the upper Ohio was the well-known diesel vessels *Jefferson* and *Patriot* of the American Barge Line fleet exchanging tows recently. The *Patriot* had a whale of a tow, some 11 barges of steel, a barge of gasoline, a barge of benzol, and some three or four of pig iron. The *Jefferson* had a bunch of empties, a couple of barges of scrap, and a couple of fluorspar. When together they almost filled the river. The *Patriot* has Cooper-Bessemers totaling perhaps 2000 hp. and the *Jefferson*, always one of the most popular on the waterways has the same "make" of main engines totalling at least 2400 hp.

NOTED ON THE upper Mississippi were several tows exceeding 16,000 tons headed upstream. The speedy new *LaCrosse Socony* with gasoline was one, her General Motors engines moving with precision. Another observed was the *A. M. Thompson*, pushing coal. The *Thompson* is no less than a sensational towboat and is powered by twin Enterprise diesels. A while back a flood was raging. Now, the water is very low, all the locks and dams being operated.

THE *PENNSYLVANIA* was being congratulated by rivermen on the upper Ohio in August. She is one of the fine Union Barge Line fleet. We saw the boat but once during the month. At that time she was down-bound with seven barges of steel, a barge of creosote, and a flock of empties. Dravo built this work boat in 1947. Her twin National Superiors will generate 2000 hp. or more.

THE *W. G. VIOLETTE* was noted at Dubuque, Iowa, headed up toward St. Paul with a 2800-ton tow of gas and oil. It was her first trip on the upper Mississippi, so far as we recall. She has twin General Motors engines, 1200 hp. She is 80 feet long, built in 1949 by the Walker yards, Pascagoula, Miss., for the Dantzler Boat & Barge Company of Pascagoula. The *Violette* is one of the best of her inches on the inland rivers.

WE GOT A good look the other day at the brand new *Quiver* recently launched at the yards of the Dubuque Boat & Boiler Co., Dubuque, Iowa. The boat belongs to the Chicago & Illinois Midland Railroad Co., and makes up the tows at the railroad coal dock at Havana, Ill. She has twin Cummins diesels.

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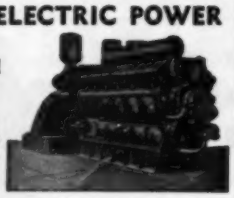

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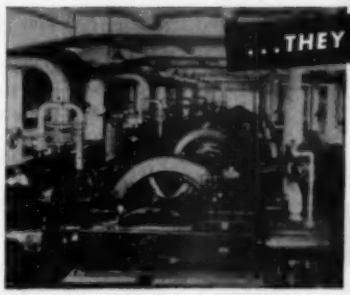

Worthington Compressors in an automobile plant, with Manzel Model 94 Lubricators

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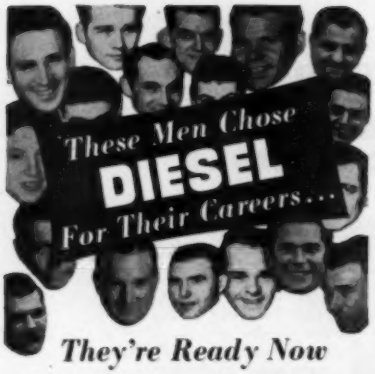

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West Coast Diesel News

By FRED M. BURT

FOR RALPH BELL, Monrovia, Calif. contractor, a Murphy 135-hp. diesel from Engineering Sales and Service, Los Angeles, to power a Northwest 80-D dragline in use on a Highway 395 construction job in San Diego County.

DESIGNED BY B. Bruce Newby, Long Beach naval architect, *Challenger*, the new 122-ft. steel tuna clipper from Avondale Marine Ways, New Orleans, propulsion by General Motors 12-cyl. 900-hp. diesel with Falk 2½:1 reduction gear, Fawick airflex clutch, auxiliaries two G.M. diesels Model 3-268A direct-connected to 100-kw. generators, on her maiden voyage made a record 249.25 ton, full capacity catch, for Capt. Manuel da Luz; Managing Owner, Lewis Livesley and associate owners.

THE NEW 48-ft. combination boat *Loui M*, built in the Sagstad yard, Seattle, for Leonard Martens, fishing out of Petersburg in Alaska waters, has for main power a 100-hp. Cummins diesel with Twin-Disc 3:1 reverse and reduction gears, purchased from Cummins Diesel Sales, Seattle.

POWERED WITH the new Model P6, 600-hp. (@ 500-rpm.) Union Marine Diesel, tug *Burnaby Straits* is reported to be making outstanding records, as per comment by Robert Preston, Port Engineer of Straits Towing Co., Vancouver, B.C. SUPPLIED BY Crofton Diesel Engine Co., San Diego, for the *Judy S*, G.M. auxiliary, 275-hp. connected to 125-kw. generator; a Crofton 5-hp. diesel auxiliary for M. Davidson's Albacore boat *Light*, out of San Diego.

FOR A TUNGSTEN mining project in Nevada, a 210 c.f.m. Gardner-Denver air compressor powered with a Model 387, 65-hp. P & H diesel, has been purchased by Fred McKinley, Paramount, Calif. contractor.

ACTING AS a marine diesel engineer, Jack N. Hoffoss has joined the staff of Shepherd Tractor & Equipment Co., Los Angeles (branches in San Pedro, San Diego). A graduate of New York University with mechanical engineering degree, Mr. Hoffoss skippered a So. Calif. fishing vessel for a year.

THE 40-FT. Albacore jig boat *Fred Holmes* working out of San Francisco has been newly powered with a 40-hp. Lister-Blackstone diesel engine.

FOR FISH AND WILDLIFE SERVICE, Dept. of Commerce, a Model AD Witte diesel to power a 3-kw. generator for lighting at the bird refuge about 25 miles from Los Vegas, Nevada.

A MODEL V6 Union diesel is being installed by Nelson Bros., New Westminster, B.C. in their *Western Challenger;* and under construction for B.C. Packers YMS conversion, is a supercharged P6 Union diesel rated 750-hp. @ 500-rpm.

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Arkansas City Kansas

FROM SHEPHERD DIESEL MARINE, San Pedro, five Model AV2 Petter diesels shipped to Santa Maria, Calif. for installation on Morro Bay fishing vessels.

DESIGNED BY Edwin Monk, 57-ft. *Yankee*, seiner for Gleonovich Bros., Bellingham, Wash. from Belilngham Shipyards, is powered with a 190-hp. General Motors diesel with 3:1 reduction gear.

AMONG MANY new Cummins diesel engines recently serviced by Cummins Service & Sales, Los Angeles—

Customer	Qty.	Truck Make	HP
West Coast Fast Freight	3	Mack	200
Pacific Fleet System	3	Mack	200
Carl Randall	2	Sterling	200
Truck Transport	2	Diamond T	200
Navajo Freight Lines	2	Peterbilt	200
Asbury & Arrowhead	2	Kenworth	200

NEW 127-FT. steel tuna clipper (temporarily *Hull 177*) designed by Wm. P. Trammel, National Steel & Shipbldg. Corp. (San Diego) yard's architect, under construction for Ocean Fisheries, Inc. will be propelled by an 8-cyl. DMG-38 Enterprise diesel; auxiliaries are two Murphy 135-wd. diesel-generating sets.

POWERED WITH A 115-hp. Caterpillar diesel is 65-ft. salmon seiner for Canadian Fishing Co., Skipper Joe Stroic, recently launched at Sterling Shipyards, Vancouver, B.C.

CREATING A new record, in addition to handling the regular major overhauls of 65 locomotive diesel units in the large Santa Fe diesel shops, San Bernardino, in August, 18 units that had been immersed for 96 hours during the Kansas floods, arriving at the shops July 31, were completely overhauled and made ready for service by August 8th.

DIESEL ENGINE CATALOG has just come off the press in its Sixteenth expanded Edition. Completely revised and re-edited, it is an invaluable aid to design engineers and buyers. ORDER COUPON ON PAGE 25.

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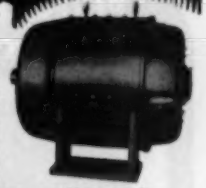

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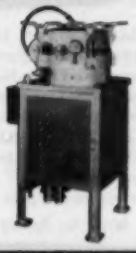

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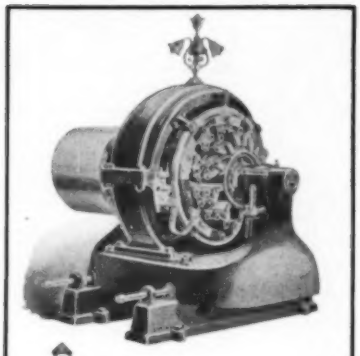
Striding ahead for 50 years



The original plant which later became the Elliott Ridgway works.

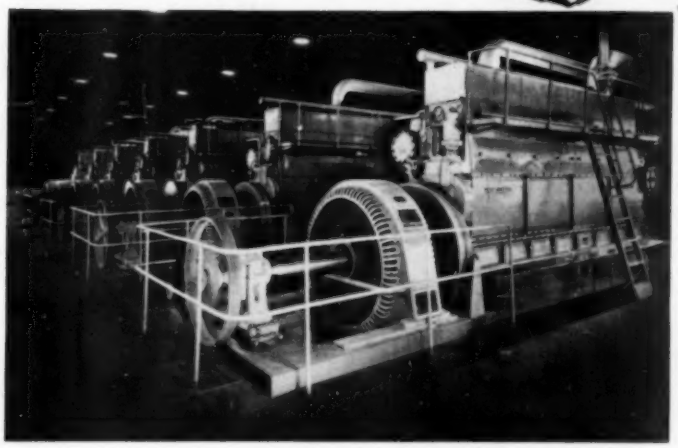
ELLIOTT GENERATORS

Successful pioneering in engineering developments is traditional with Elliott. The quaint-looking generator on the left is a curiosity now, but was once far ahead of its field, being the first compensated-wound d-c generator to attain commercial success. It was built by the predecessor of Elliott Company in what is now Elliott Company's Ridgway plant.

From then to now, Elliott Company achieved leadership in many important motor and generator developments, among the latest being the application of modern steel plate welded fabrication to motor and generator design. The Elliott "Fabri-Steel" line today sets new standards in performance and maintenance economy.

True 50 years ago, and true today—"You're a step ahead with Elliott."

The Ridgway Division of Elliott Company as the plant looks today. The section printed in black shows the plant additions during the past half century.



Modern Elliott "Fabri-Steel" synchronous generators driven by Diesels, in an up-to-the-minute power plant.

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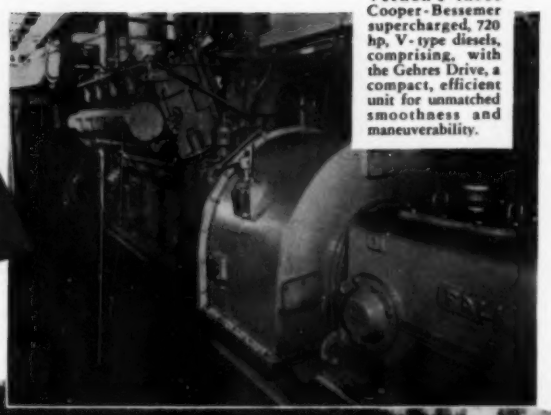
Mount Vernon

WITH THE

GEHRES DRIVE



One of the Mount Vernon's three Cooper-Bessemer supercharged, 720 hp, V-type diesels, comprising, with the Gehres Drive, a compact, efficient unit for unmatched smoothness and maneuverability.

The Mount Vernon, northbound on the Ohio with a 115,000 barrel tow of oil products. Operated by the American Barge Company, the vessel was designed and built by Jeffersonville Boat and Machine Company.

HOW MANEUVERABLE CAN A TOWBOAT BE?

American Barge Line's new triple-screw towboat, Mount Vernon, provides the answer to this question —and *what* an answer!

Equipped with Cooper-Bessemer's Gehres Drive, the Mount Vernon's propellers can actually be reversed from full speed ahead to full astern in 5 to 7 seconds! And, not only is the new Mount Vernon an exceptionally *fast* towboat, but she shows the smoothest, most easily controlled *creeping* speed ever! That's because her propellers can be rotated at *any* speed down to zero, while the engines run at their normal idling speed of 325 rpm.

These are only a few of the maneuverability features of the Mount Vernon . . . but mighty important ones you'll agree.

Why not get *all* the facts on the Gehres Drive? Teamed up with efficient Cooper-Bessemer diesels, this modern drive offers you reliable workboat performance at its best.

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